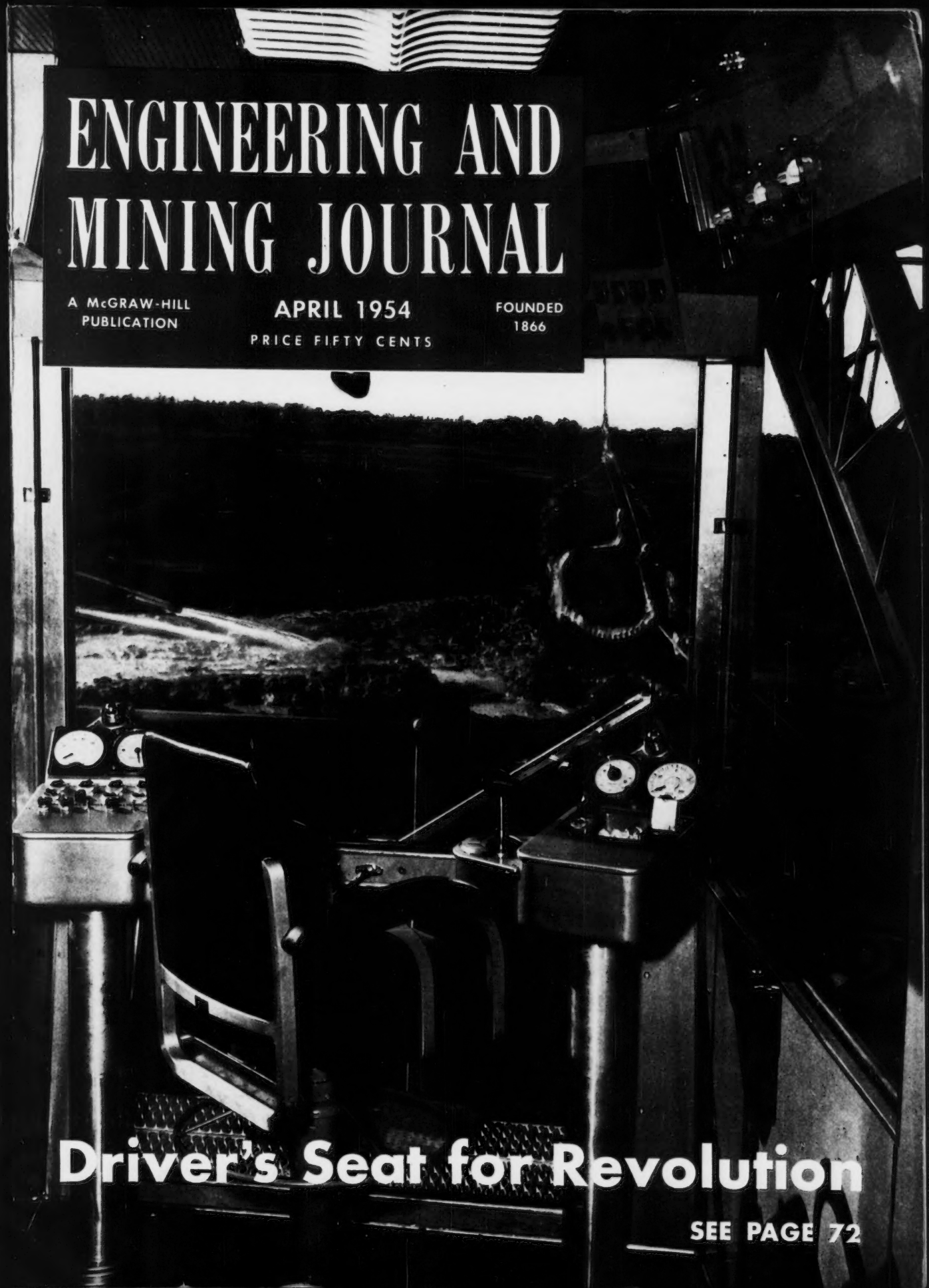

ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

APRIL 1954

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Driver's Seat for Revolution

SEE PAGE 72

A gold mine in the mountains of Luzon, Philippine Islands, 1937

No, the native was not bent on destruction. This full-blooded Igorot policeman, sporting carabao teeth as headdress and a head axe as badge of authority, was proud to be photographed beside a B-Frame Hydroseal. This pump, a forerunner of many Hydroseals selected by Philippine companies on basis of performance, was used in handling classifier overflow at the gold mine as early as 1937.

Wherever miners go Hydroseals go

In the far-flung mining areas of the world Hydroseals are proving themselves essential to efficient, profitable operation. Their savings in power and in maintenance are reflected in repeat orders for expansion programs everywhere.

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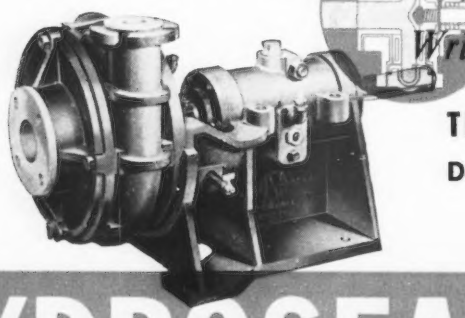
SAND · SLURRY · DREDGE
pumps



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Representatives throughout the World

HYDROSEAL and CENTRISEAL
SAND, SLURRY & DREDGE PUMPS
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INGERSOLL-RAND HYDRAULICALLY-OPERATED

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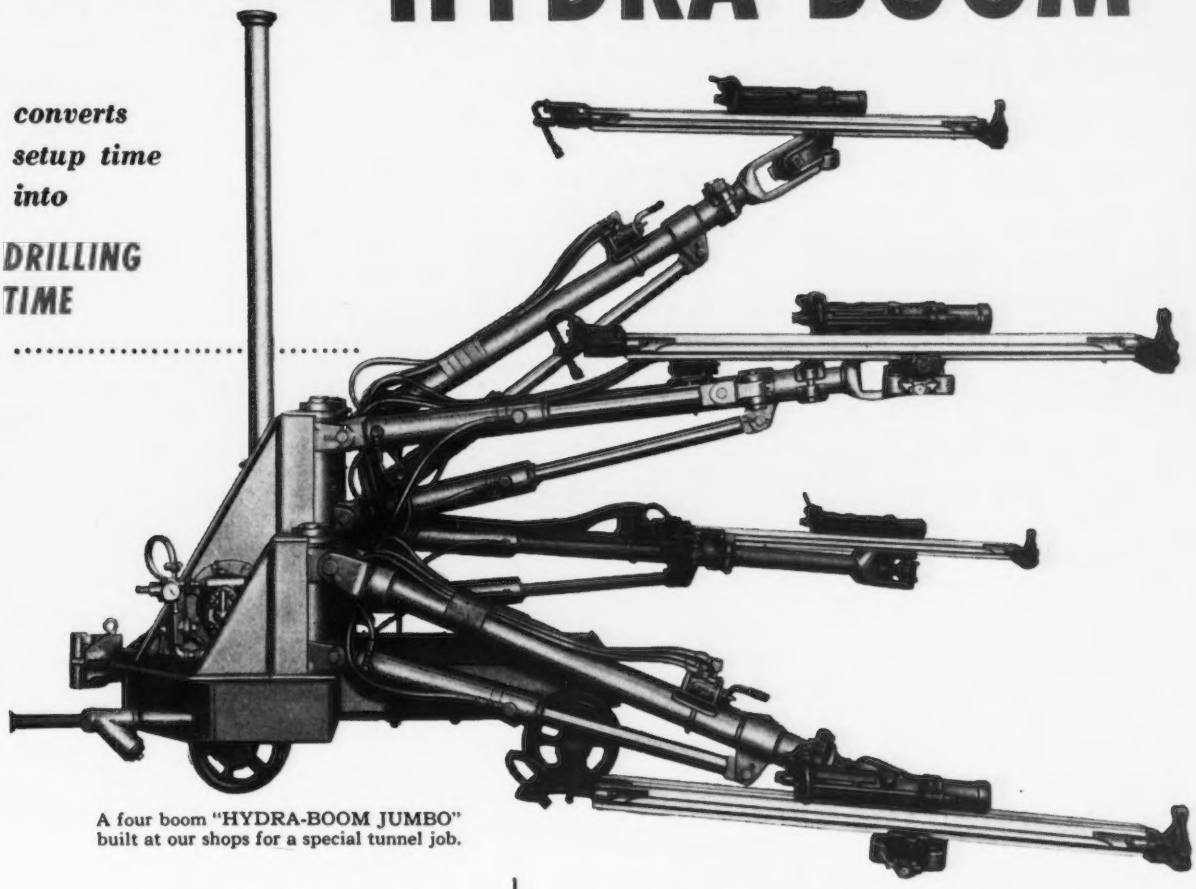
converts setup time into

DRILLING TIME



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1. LARGER PISTON ARM CYLINDERS for lower oil pressure and longer packing life. They will handle longer and heavier drill feeds.

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3. EXTRA LONG PISTON ARMS give unmatched stability.

4. LOWER OVERALL HEIGHT for lower headroom clearance.

Four new design features plus individual built-in oil reservoirs make the HYDRA-BOOM the outstanding hydraulically operated drill mounting of today. All HYDRA-BOOM movements, including the ceiling jack, are controlled by an air motor driven hydraulic pump — no hand pumping is ever necessary. And in addition, the hydraulic system is kept under constant pressure to insure instant and positive control at all times.

Simplicity of design, low height and built in hydraulic oil reservoirs permit the mounting of one or more HYDRA-BOOMS on practically any kind of Jumbo that may be required. A two-boom car mounted HYDRA-BOOM Jumbo is standard but let us quote you on special rigs to suit your individual requirements. Optional extendable hydraulic booms are available for use on jobs that require greater face coverage.

The new I-R HYDRA-BOOM may mean important savings for you so be sure to get the complete story from your I-R representatives without delay.

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ENGINEERING AND MINING JOURNAL

88th YEAR OF PUBLICATION

A McGRAW-HILL PUBLICATION

VOL. 155 NO. 4

APRIL 1954

FEATURE ARTICLES

Editorial 71

Revolution in Control ..... R. H. Ramsey 72

Captured Canadian Power Feeds Giant New Source of Aluminum ..... J. H. Kearney 78

Ireland's Lead, Zinc Miners Await Favorable Market Prices ..... Gerald Moorhead 86

New Leaching Plant at Cananea ..... R. C. Weed 88

Chrome Ore Mining in Turkey ..... H. F. Kromer 92

Big Boom at Big Indian ..... Burt Meyers 96

REGULAR DEPARTMENTS

New Products Digest 35

Outlook 67

Markets 68

Behind the By-Lines . 70

Washington Impact . 100

Operating Ideas 102

Personals 102

This Month in Mining 120

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Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder.

Publication Office, 1309 Noble St., Philadelphia 23, Pa. Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation.

Subscriptions: Address correspondence to Engineering and Mining Journal—Subscription Service, 1309 Noble St., Philadelphia 23, Pa., or 330 West 42nd St., New York 36, N.Y. Allow one month for change of address.

Subscriptions are solicited only from management, production and maintenance executives and engineers in the metal and nonmetallic mining and refining industry. Position and company connection must be indicated on subscription orders.

Branch Offices and District Managers: Atlanta 3, R. H. Sidur; Chicago 11, F. W. Roets, G. A. Mack; Cleveland 15, W. M. Spears; Dallas 1, J. H. Cash; Los Angeles 17, C. W. Dysinger; New York 36, T. E. Alcorn, John B. Lewis; Pittsburgh 22, H. C. Chellson; Philadelphia 3, W. A. Potter; St. Louis 8, F. W. Roets; San Francisco 4, J. W. Otterson; Washington 4, D. C. London address: McGraw-Hill Publishing Co., Ltd., McGraw-Hill House, 95 Farringdon Street, London E. C. 4, England. Cable address: McGrawHill, London.

News Bureaus: Atlanta 3; Cleveland 15; Detroit 26; Houston 25; San Francisco 4; Washington 4.

World News Offices: London, Frankfurt, Manila, Mexico City, Paris, Sao Paulo, Tokyo.

Price of this issue 50c. Subscription rates: United States and possessions, $3 a year, $4 for 2 years, $5 for 3 years. Canada, $5 a year, $8 for 2 years, $10 for 3 years. Other Western Hemisphere, $8 a year, $12 for 2 years, $16 for 3 years. Elsewhere, $15 a year, $25 for 2 years, $30 for 3 years.

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Entered as second class matter May 24, 1951, at the Post Office at Philadelphia, Pa. under the Act of March 3, 1879.

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LETTERS

Humphreys 3; Du Pont 0

SIR:

May we note a correction respecting the article on "Ore Dressing" by Mr. (Bunting S.) Crocker (*E&MJ*, February 1954, p 122)?

Mr. Crocker states, "DuPont de Nemours Co. has plants at Jacksonville, and Starke and is planning another (the Highland plant) to start early in 1955 near Lawtey, Fla."

DuPont has no plant at Jacksonville. Humphreys Gold Corp. has a plant, built in 1944, near Jacksonville, producing rutile, ilmenite, zircon and monazite under contract with National Lead Co. At this plant Humphreys spirals have been in operation continuously for ten years and no spiral section has yet been replaced.

Humphreys Gold Corp. (in 1948) also built and operates for DuPont the titanium mineral plant known as the Trail Ridge Plant, near Starke . . . and is now building and will operate for DuPont a similar plant known as the Highland Plant, near Lawtey. At the Trail Ridge location, Humphreys . . . also produces zircon for its own account and with its own plant equipment.

JUDSON S. HUBBARD
Humphreys Gold Corp., Denver 2, Colo.

Lady Rockhound

SIR:

I am a girl of eight. I have a hobby of collecting rocks. I wrote to the United States Department of the Interior and they suggested you. I wish you could send me some information on rocks. Your kindness will be appreciated.

JANET FRANCES CAMERON
Huntingdon Station, N. Y.

Ed: *Let it never be said that E&MJ refused a lady's request for "information on rocks." But before any ladies of a slightly more advanced age take pen in hand, let us say that we have no advice on getting rocks for the third finger, left hand.*

Cross Section Study

SIR:

In an article in (*E&MJ*, December 1952, p 84) Elmer V. Reinhardt asks, "Can cross sections of mountain ranges be used as guides to discover new mineralized areas?" He gives three reasons for believing that they can.

Like Mr. Reinhardt, I believe cross sections can be used as guides, but for a different reason than he gives. Stocks and cores of mountain ranges being, as a rule, of a lower specific gravity than the surrounding rock, are likely, according to the theory of isostasy, to be pushed up past the surrounding formation, thus opening channels for the hy-

(*Continued on p 186*)

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

20 million tons in 14 years B. F. Goodrich belt still at work

IF you need a conveyor belt that will stand any kind of material-handling job, whether above ground or below, B. F. Goodrich has developed just the belt for you. It's the B. F. Goodrich *cord* conveyor belt.

Layers of separate cords, each surrounded by rubber, run the length of the belt. This makes the belt strong to carry heavy loads, yet flexible enough to trough perfectly even if running empty. When the belt is slammed with heavy chunks, the cords "give"—roll with the punch—then the flexible rubber brings the belt back to normal carrying shape.

Every cord belt has double protection against mildew. If an accident should cause a cover cut and expose a cord ply, there are no cross threads to absorb and spread moisture that will weaken or rot the belt. The rubber surrounding each cord restricts moisture to the cut spot. In addition, the belts are treated with special chemicals which protect against mildew.

That's why the B. F. Goodrich cord belt in the picture has hauled 20 million tons in 14 years. Why it has carried everything from razor sharp slivers to huge chunks without once causing a shutdown.

The material you haul may be large and heavy, and drop onto belts with crashing blows. Or it may be fine, small but sharp and piercing. In either case, you can cut hauling costs with a B. F. Goodrich cord belt. To get further information, call your local BFG distributor, or write *The B. F. Goodrich Company, Dept. M-215, Akron 18, Ohio.*

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INDUSTRIAL PRODUCTS DIVISION

EVERY STRAND, EVERY CORE gets extra protection...

FOR OVER 20 YEARS, MORE COPPER ORE HAS BEEN MINED IN THE U.S. WITH TEXACO-LUBRICATED EQUIPMENT THAN WITH ANY OTHER

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radio broadcasts
every Saturday afternoon.
See newspaper for
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TEXACO

TEXACO
REG. T.M.

WITH TEXACO CRATER your wire rope will stay strong longer. That's been the experience of operators everywhere. *Texaco Crater* is the *penetrating* lubricant that: 1) coats each metal strand with a tough, long-lasting wear- and rust-defying film; and 2) surrounds and preserves the hemp core, adding greatly to its life. You can count on *Texaco Crater* to bring down your wire rope maintenance costs.

On open gears, *Texaco Crater* also does an outstanding preventive maintenance job. It clings to the teeth, won't ball up or throw off . . . provides a cushion against shocks and heavy loads. Gears run more quietly, wear is greatly reduced.

For convenience in application, many operators prefer *Texaco Crater X Fluid.* It *goes* on (without heating) as a liquid, and *stays* on just like the regular *Crater.*

In mine car wheels, use *Texaco Olympian Grease.* It assures easier starts, winter and summer; reduces maintenance costs for plain, cavity hub and anti-friction bearings.

A Texaco Lubrication Engineer will gladly help you make savings through effective lubrication. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Lubricants and Fuels

FOR THE MINING INDUSTRY

"Only tractor that will stand up under abrasive action..."

says Silica Mine Owner

E. J. AuBuchon

about Tournatractor

AuBuchon Silica Mining Co., Crystal City, Missouri, produces silica sand for glass and steel manufacturing. They are currently working a 40-ft. strata of St. Peter's sandstone, which is blasted and then truck-hauled to the crushing and screening plant.

Formerly, this company used crawler-tractors to strip sandy clay and rock overburden from the pit. However, the rough rock floor, plus the continuous grinding of tracks in silica sand, ruined the crawlers quickly — the last one, according to the owner, was "beyond repair" inside of 11 months. To keep this from happening again, AuBuchon brought in a rubber-tired Tournatractor.

Now, after several seasons of work with rubber-tired tractors, 4 points are apparent:

1 — Tournatractor's big tires roll easily over the rocks which frequently broke track pads.

2 — Tournatractor's sealed anti-frictions keep moving parts out of the abrasive sand which ground away tracks.

3 — Tournatractor's 186 hp, coupled with 19 mph forward and 8 mph reverse speeds, enable it to do most jobs much faster than a crawler.

4 — With normal care and maintenance, Tournatractor should last for years instead of just 11 months.

Commenting further on the superiority of tires over tracks, Company Vice-President E. J. AuBuchon says, "Our Tournatractor is doing a fine job. We have found it is the only tractor that will stand up under the rocky hard floor of our operation. Crawler-tractors just can't take the abrasive action of sandstone."

All-Purpose Tool

There have been production advantages, too. Tournatractor clears trees and dozes overburden and rock up and down wet 8 to 10% grades with little trouble. Its 2½-yd. blade

LET

WHY CRAWL WHEN YOU CAN RUN?

dozes full loads of overburden weighing 2700 lbs. per cu. yd. With its "go-anywhere" 19 mph mobility, it also has time to handle a wide variety of jobs . . . including cleaning the quarry floor around shovel, piling chunk rock for shovel loading, building roads, and stripping overburden beyond the pit limits. And that's not all . . .

On 200′ push, 70 yds. hourly

Tournatractor's operator H. W. Plass says, "I've stripped better than 7,000 yds. of dirt in 100 hours (200′ push), and I could still find time to clean up around the shovel and do other extra jobs. The torque converter and down-pressure dozer blade makes Tournatractor a fine tool for this type of work. It is a fine machine for the operator."

Tournatractor's fast working speeds on rubber can pay off in increased production and lower maintenance costs for you, too. Ask your LeTourneau-Westinghouse Distributor for a demonstration of Tournatractor on your job, so you can judge its advantages for yourself.

Electric control down-pressure

LeTourneau-Westinghouse has eliminated hydraulics and complicated mechanical linkages for blade control. There are no delays for pressure to build up . . . no cold weather freeze-up. The short cables are always under balanced tension . . . no slack to take up, no kinking or piling up on drum flanges.

Blade, with down-pressure, can be raised as high as 54" or lowered as much as 18" below ground level. By watching height of push-beam, operator knows how deeply blade is penetrating. Down-pressure eliminates "blade bouncing" and "washboard cuts."

Tournatractor—Trademark T-411-M

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Design Features

1 End-seating valve is fast and positive in action. It meters the air efficiently — keeps air consumption down, provides powerful force of blow and strong rotation. Performance of valve is not affected by wear.

2 Positive lubrication system distributes oil throughout the machine and insures long life for all moving parts. Rifle bar is oiled at every stroke of piston. This prolongs the life of rifle nut and rifle bar at least 50%.

3 All Le Roi-CLEVELAND Sinkers are famous for strong, positive rotation. That's why they are at their best when the drilling's the toughest. Properly designed rotation parts—ratchet, pawls, rifle bar and rifle nut—plus efficient lubrication of these parts, give you this important drilling advantage.

4 Exhaust ports are large — they avoid freezing.

5 Plenty of hole-cleaning power is provided in all Le Roi-CLEVELAND Sinkers, so that you can get the most out of their powerful force of blow and strong rotation. Bit wear is reduced and drilling speeds are faster.

6 Floating-type chuck permits slight misalignment without binding piston. This reduces piston scoring, adds to life of the machine.

7 Throttle valve is designed to stay in any desired operating position from full-on to blowing. All parts are fully enclosed, protected from dirt, and generously lubricated.

Here's the "inside story"

of why Le Roi-CLEVELAND Sinkers drill more footage per shift, stay underground longer

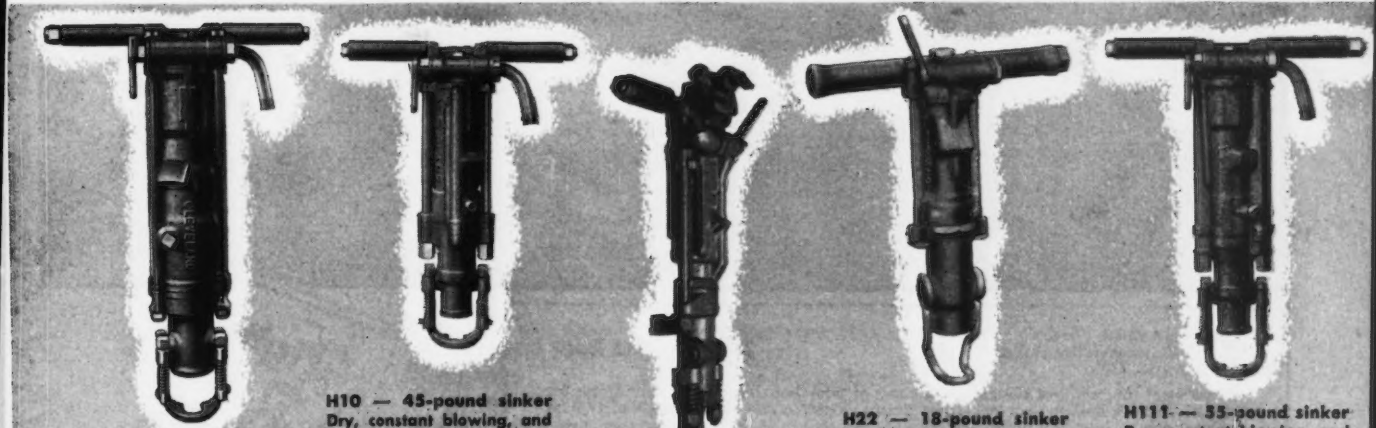
THERE are things you *can't see,* behind Le Roi-CLEVELAND dependability—"hidden values," design details. But you know *they're there*—because that's why Le Roi-CLEVELAND Sinkers drill more feet of hole per shift . . . why they run at peak efficiency day in and day out . . . why they lower drilling costs on any job that requires a hand-held drill.

It's Le Roi-CLEVELAND *engineering* that gives you performance advantages that really pay off for you: Low air consumption. Easy handling. Strong rotation. High drilling speed.

Le Roi-CLEVELAND has a complete line of sinkers from 18 to 80 lbs. Your Le Roi representative can show you why you're money ahead with any one of them. See him soon.

Write for free Bulletin No. RD25.

CLEVELAND ROCK DRILL DIVISION
Le Roi Company
A Subsidiary of Westinghouse Air Brake Co.
12500 BEREA ROAD • CLEVELAND 11, OHIO
Plants: Milwaukee, Cleveland and Greenwich, Ohio



H23 — 83-pound sinker Dry and wet types. 1"x4¼" hex or quarter-octagon. 1⅛" or 1⅜" lug shank. Designed for shaft sinking in hard rock or bad, faulting ground . . . general drilling with heavy steel in hard rock.

H10 — 45-pound sinker Dry, constant blowing, and wet types. ⅞" x 3¼" and 1" x 4¼" hex or quarter-octagon chucks. Wet automatic dust-control back-head, if desired.

H166 — 33-pound sinker Wet and dry types. ⅞" x 3¼" chuck. Recommended for hard coal. Also ideal for wet or dry drilling in shale, limestone, sandstone, etc.

H22 — 18-pound sinker Wet and dry types. ⅞" x 3¼" chuck. Recommended for: Drilling holes for trolley hanger bolts. Cleaning up roof. Clearing out rock falls. Brushing bottom. Drilling oversize pieces at grizzley. Cutting hitches.

H111 — 33-pound sinker Dry, constant blowing, and wet types. 1" x 4¼" chuck (⅞" x 3¼" and popular sizes of quarter-octagon and lugged steel chucks also available.) Wet automatic dust-control back-head, if desired. Primarily designed for hard rock, but equally efficient in soft and medium formations.

Air-feed mountings up to 10' steel changes.

RD-52

12,587 carloads of

American Steel & Wire
Room 842, Rockefeller Building
Cleveland 13, Ohio

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Please send me, without obligation, a copy of your booklet, "The Right Rope for the Job," which lists the correct Tiger Brand Ropes to use for hundreds of typical applications.

Name.....

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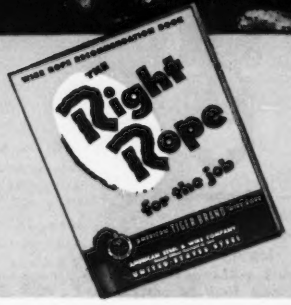


overburden moved with one Tiger Brand Hoist Rope

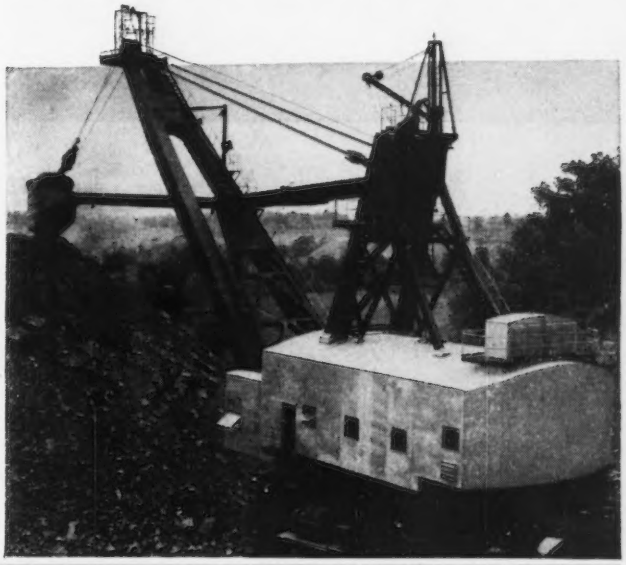
IMAGINE 12,587 50-ton freight cars strung out end-to-end. They would make a train more than 80 miles long; and if each car was level full, the entire train would contain 1,000,000 cubic yards of material. That's how much overburden this big coal stripping shovel moved with one American Tiger Brand Hoist Rope.

Despite hard digging, a 2⅜" Tiger Brand Wire Rope lifted and lowered the fully loaded 45 cu. yd. bucket *20,000* times before it had to be replaced. This equipment is used by Central Ohio Coal Company which supplies coal for The Ohio Power Company's new Muskingum River electric power generating plant. This company also uses Tiger Brand Wire Rope on its 18 cu. yd. shovels.

You will like Tiger Brand, too. It lasts long in *any* type of service.

Send the coupon for our recommendations of the right rope to use on your machines.

Regular lubrication of sheaves helps prevent excessive wear of the Tiger Brand Ropes on these big machines.



This 18 cu. yd. electric shovel and the 45 cu. yd. job shown on the opposite page are stripping overburden 3 shifts a day *every* day at Central Ohio Coal Co.'s big Muskingum Mine near Zanesville, Ohio. Tiger Brand Rope is giving excellent service on both these hard-working machines.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION
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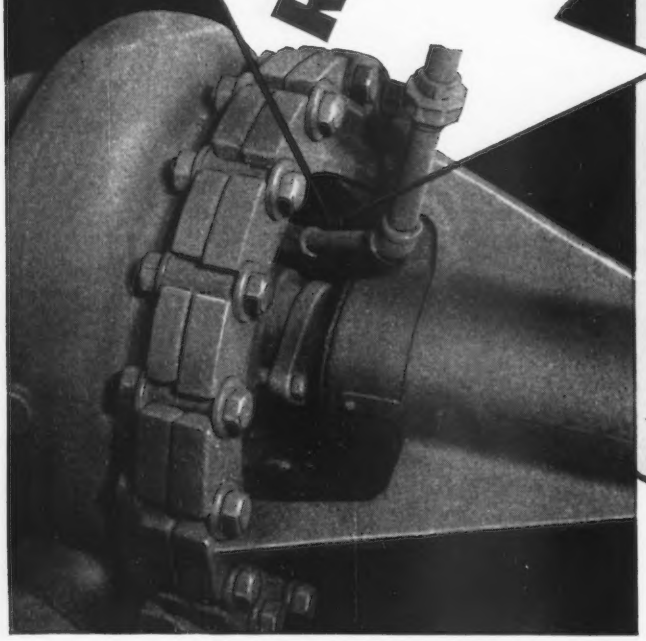

- ALL MAINTENANCE POINTS ARE EASY TO REACH.
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- MANY PARTS INTERCHANGEABLE BETWEEN DIFFERENT PUMP SIZES.

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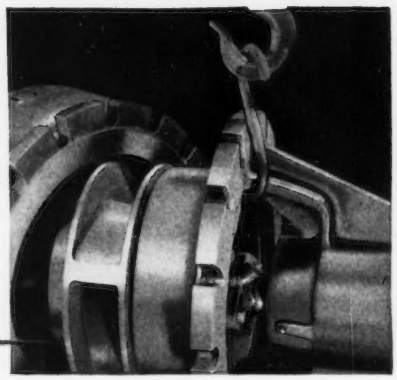
Disconnect drive, loosen casing bolts and lift bolt assembly from slots. Bolt, nut and washers are still connected for easy reassembly.

Swing out rotating element. Neither suction or discharge piping is disturbed. All wearing parts are fully accessible for inspection or service.



FOR HELP ON YOUR SOLIDS HANDLING PROBLEMS, call your nearest Allis-Chalmers District Office. For more information, write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 52B6381.

A-C ALLIS-CHALMERS

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HERE'S a piece of equipment you can put almost anywhere a truck will go! It will serve on maintenance and repair jobs where heavy lifting is required. It will save money on new construction either on building, on road work or on railroad jobs. It will handle any type of material, drive piles, swing a magnet, dig ditch, set new machinery! What is your problem?

The Northwest Truck Crane brings you a combination of advantages found in no other similar equipment. It combines all the Northwest Crane advantages, the "Feather-Touch" Clutch Control for easy operation, Uniform Pressure Swing Clutches, a choice of Boom Hoist Equipment, cast steel machinery bases and side frames and many other advantages with improvements in Truck design and construction that assure easier operation and greater versatility.

Let us send you complete details on this rig. There is a detailed catalog that will interest you. Write for it.

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What it will do!

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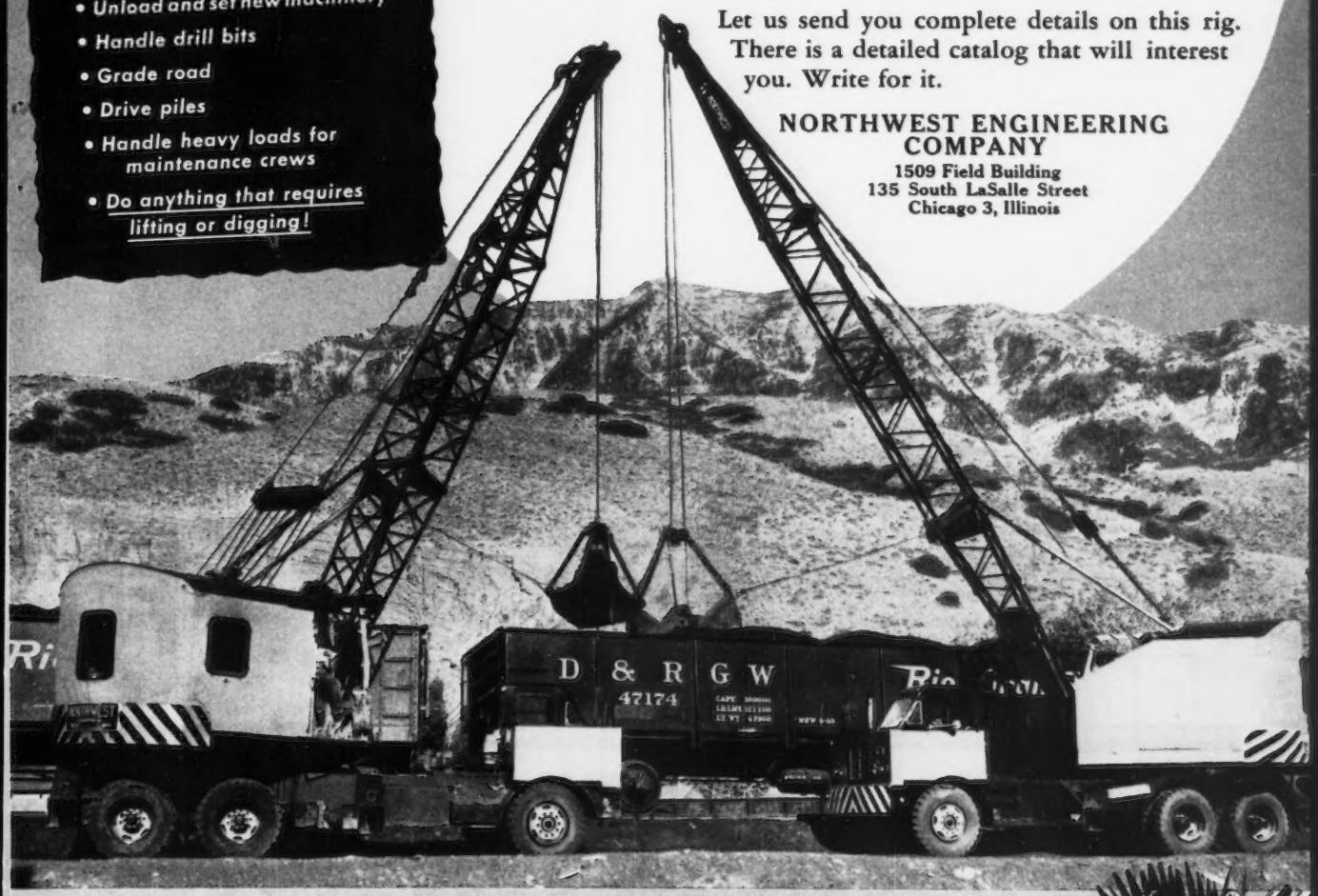
- Ditching work for drainage
- Set track
- Handle concentrate
- Unload skulls
- Handle mine timbers
- Handle steel
- Move equipment
- Unload and set new machinery
- Handle drill bits
- Grade road
- Drive piles
- Handle heavy loads for maintenance crews
- Do anything that requires lifting or digging!



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"Here I'm using *Plastic Reinforced* Primacord for my branch line. It has a tough plastic cover and a tensile strength of 250 pounds. But a 500-foot reel of it weighs only 12 pounds. I use it for deep wet holes and for river crossings . . . also whenever a field shot must stand a long time before blasting.

"But I never try to tie a knot in *Plastic Reinforced* Primacord. Instead, I use a double hitch in my *Plain* Primacord trunk line, like this. *Plain* Primacord grips the plastic cover and can be drawn up tight, forming the correct right-angle connection which gives best results.

"Little things like this can make a big difference in blasting. For best results, use the *right* Primacord — and use it *right*." P-14

See your explosives supplier or write for information to

THE ENSIGN-BICKFORD COMPANY

Simsbury, Connecticut

Also Safety Fuse since 1836

PRIMACORD® *detonating fuse*

PROVED and APPROVED

1 STEP UP SHOVEL SPEED, YARDAGE. This shovel performs faster, more smoothly, thanks to G-E drive system with amplidyne control. Digging power is increased. The G-E amplidyne system improves response and acceleration. It controls shovel motions precisely, and also prevents excessive current and torque peaks which might damage equipment.

5 ways General Electric can help you mine more tons per man-hour

1. **Step up shovel speed, yardage**
2. **Haul more ore**
3. **Get full voltage at point of use**
4. **Cut relocation time**
5. **Increase drill footage**

SEE NEXT PAGE FOR DETAILS

GENERAL ELECTRIC

2 HAUL MORE ORE. High availability of General Electric locomotives means you can haul greater tonnages. In normal use, G-E locomotives are on the job 24 hours a day, seven days a week, with little time required for maintenance.

G-E ENGINEERED ELECTRICAL SYSTEMS MEAN

Faster open pit mining at less cost

You need speed, flexibility, and safety in your open pit mining operations if you are to meet present demands for higher production per man-hour. General Electric's modern, engineered electrical systems can help you do this in five ways:

1. You can speed up the digging cycle. G-E amplidyne-controlled drives provide faster hoist, swing, and crowd action on power shovels. Shovels work around the clock with minimum time lost for maintenance or repairs.

2. You can haul greater tonnages. G-E locomotives have outstanding records for high availability. They maneuver rapidly, efficiently, and help speed all switching operations. Easily accessible for maintenance.

3. You can increase mining efficiency and safety with G-E unit substations. They improve voltage levels—make full equipment capacity available. Distribution losses are reduced. Grounding systems help protect personnel and equipment.

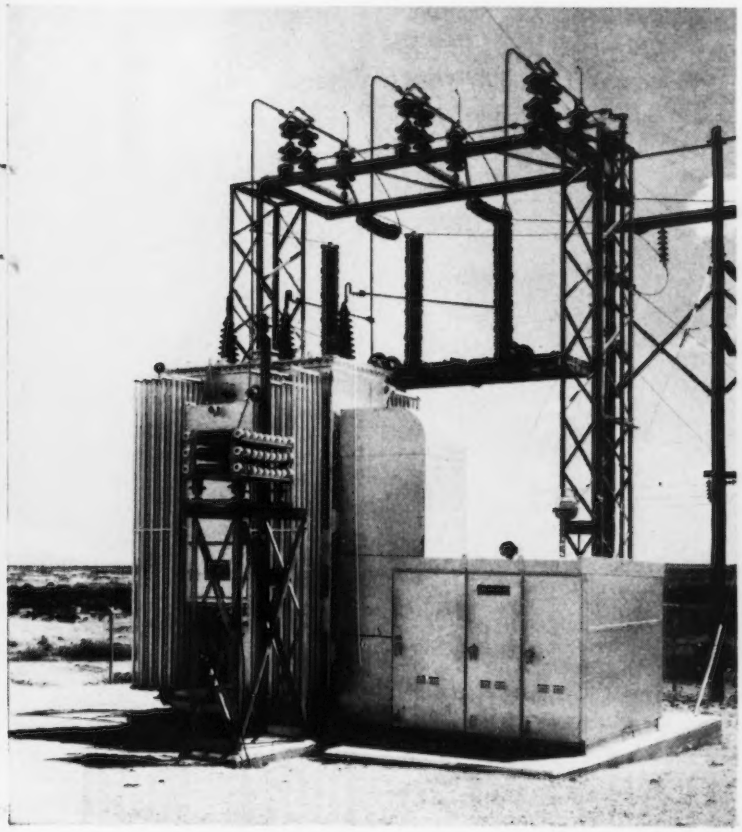
4. G-E cable-skid switch houses give a more flexible power system arrangement. You can cut relocation time of all equipment. Moving is simplified. Cable connecting time is minimized.

5. You can step up drilling speed. Modern rotary and churn drills, powered by General Electric, are self-propelled. Smooth, fast control and rugged motors help them to drill harder rock at higher speeds.

These production-boosting techniques can be applied to your surface mining operation. A G-E mining industry specialist can show you how. Contact him at your nearest G-E Apparatus Sales Office. General Electric Company, Schenectady 5, New York. 660-31

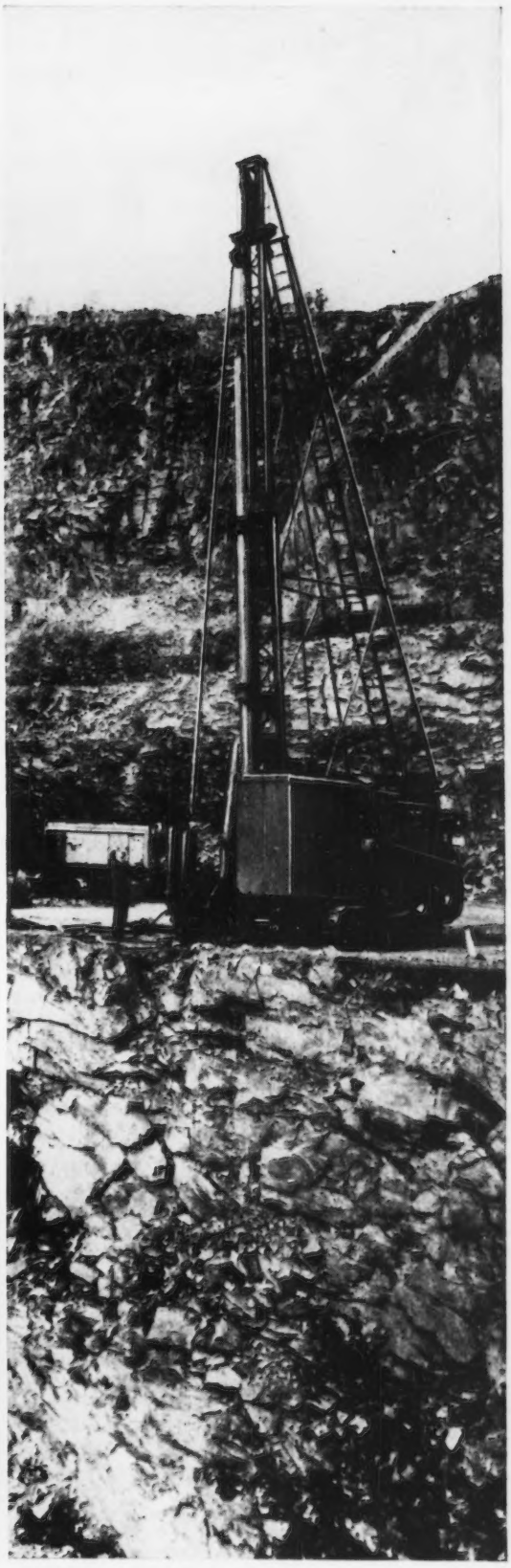
Engineered Electrical Systems for the Mining Industry

GENERAL ELECTRIC

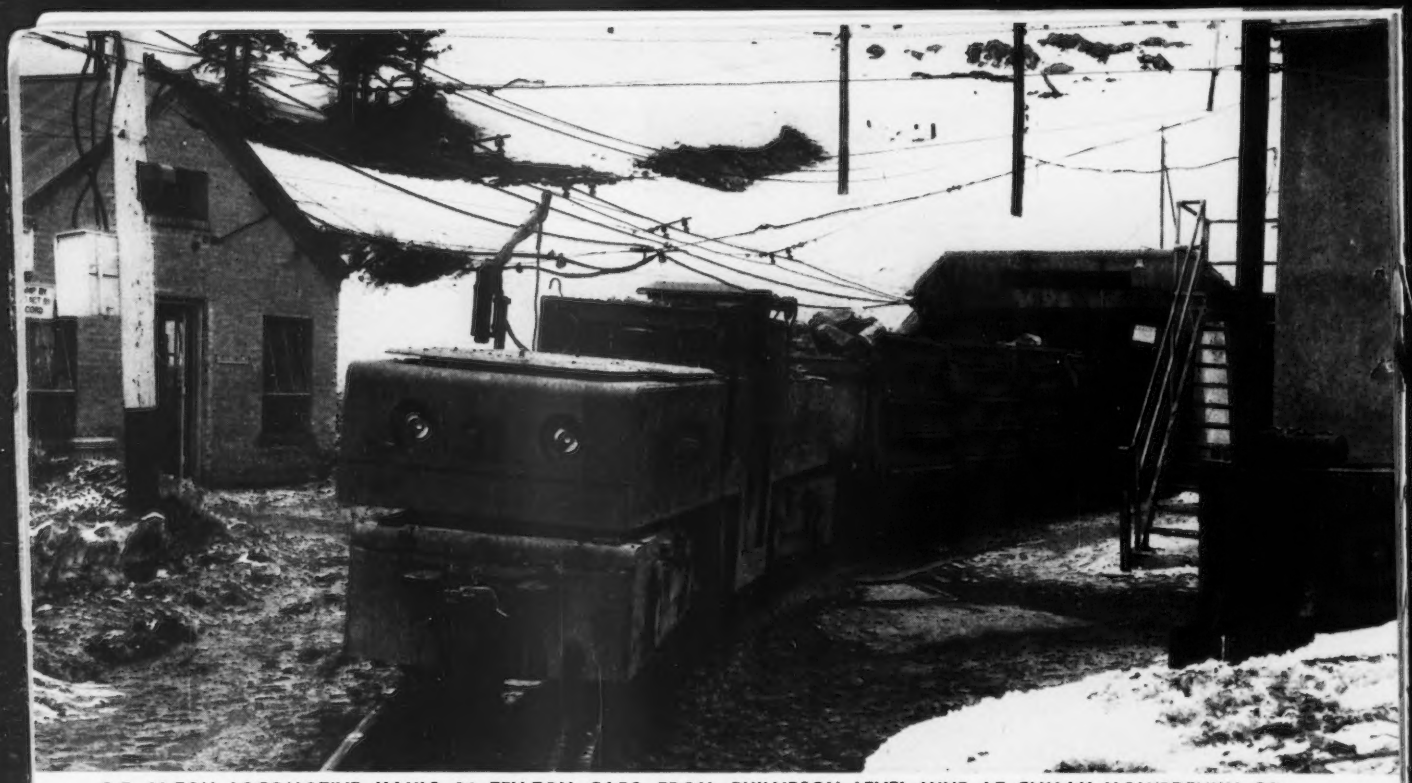


3 GET FULL VOLTAGE AT POINT OF USE by locating G-E factory-assembled unit substations near work area for full equipment capacity. Magne-blast breakers help protect feeders; lightning arresters help prevent outages; grounding resistors increase safety.

4 CUT RELOCATION TIME. Standard G-E cable-skid switch house has polarized couplers to simplify and speed up cable interchanging. Easy-to-move skid house means flexible power system.



5 INCREASE DRILL FOOTAGE. Self-contained churn drill, powered by G.E., provides rapid rock penetration, promotes effective drilling, blasting practices.



G-E 20-TON LOCOMOTIVE HAULS 24 TEN-TON CARS FROM PHILLIPSON LEVEL MINE AT CLIMAX MOLYBDENUM CO.

Climax Molybdenum hauls 20% more load with faster, more powerful G-E locomotives

When Climax Molybdenum Company decided to replace some high-maintenance haulage locomotives at its mine in Climax, Colorado, it purchased two 20-ton four-axle, swivel-truck G-E locomotives. The company based its choice on the outstanding performance of the smaller G-E locomotives already in use at the mine.

Placed in service in January, 1953, the two new G-E locomotives have enabled Climax to increase efficiency. Each locomotive can haul four more cars per trip—a twenty percent increase in load. Also, higher speeds possible with these G-E locomotives mean more round trips per day. The result is higher production at the mill.

FINE PERFORMANCE IN EXTREME CLIMATE

The center cab design of the new locomotives increases operator safety. G-E heaters keep operators comfortable—even when winter temperatures drop to a wind-swept 30 below in the thin air at 11,500 feet.

Maintenance costs on these haulage locomotives have been low, despite the bitter climate in which they work and the heavy loads imposed on them. The fine performance of the new locomotives played an important part in Climax's decision to order an additional five similar units, which have recently been delivered.

One of the several types of mine locomotives G.E. manufactures is probably right for your haulage requirements. You can get more information through your nearest G-E Apparatus Sales Office. Or, write to: *General Electric Co., Section 120-68, Schenectady 5, N. Y.*

OPERATORS LIKE THE SAFER, HEATED CENTER CAB

You can put your confidence in—

GENERAL ELECTRIC

IT PIERCES ROCK AT 25 ft./hr.

and only EMERALD CORD Hose stands the pace

GOODYEAR INDUSTRIAL PRODUCTS
G T M -Specified
EMERALD CORD HOSE
A Nonporous, nonflaking, oil-resistant synthetic tube
B Horizontal-braided, "Adhezo"-impregnated, high-strength cord for thinner walls, greater adhesion, extreme flexibility
C Super-tough, nongouging, green cover

SUSPENSION BLOWPIPE JET PIERCING MACHINE burns its way through granites, taconites, quartzites, dolomites and similar rock at 20 to 30 feet per hour. Note hose following the burner right down the hole. Photos courtesy Linde Air Products Company.

Emerald Cord—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

THIS machine literally burns blast holes into solid rock at 15 to 20 times normal drilling speed. Its white hot flame—well over 3000° F.—creates great thermal stresses that crumble the rock into fine particles. Water, also used to cool the burner, is ejected into the hole, turns to steam and blows these particles to the surface.

Big problem for designers was getting the kerosene, oxygen and water down to the blowpipe. Hose was the only answer. But every one they tried failed in a day, or less, from the rugged combination of steam, fuel, oxygen and severe abrasion by sometimes red-hot rock particles.

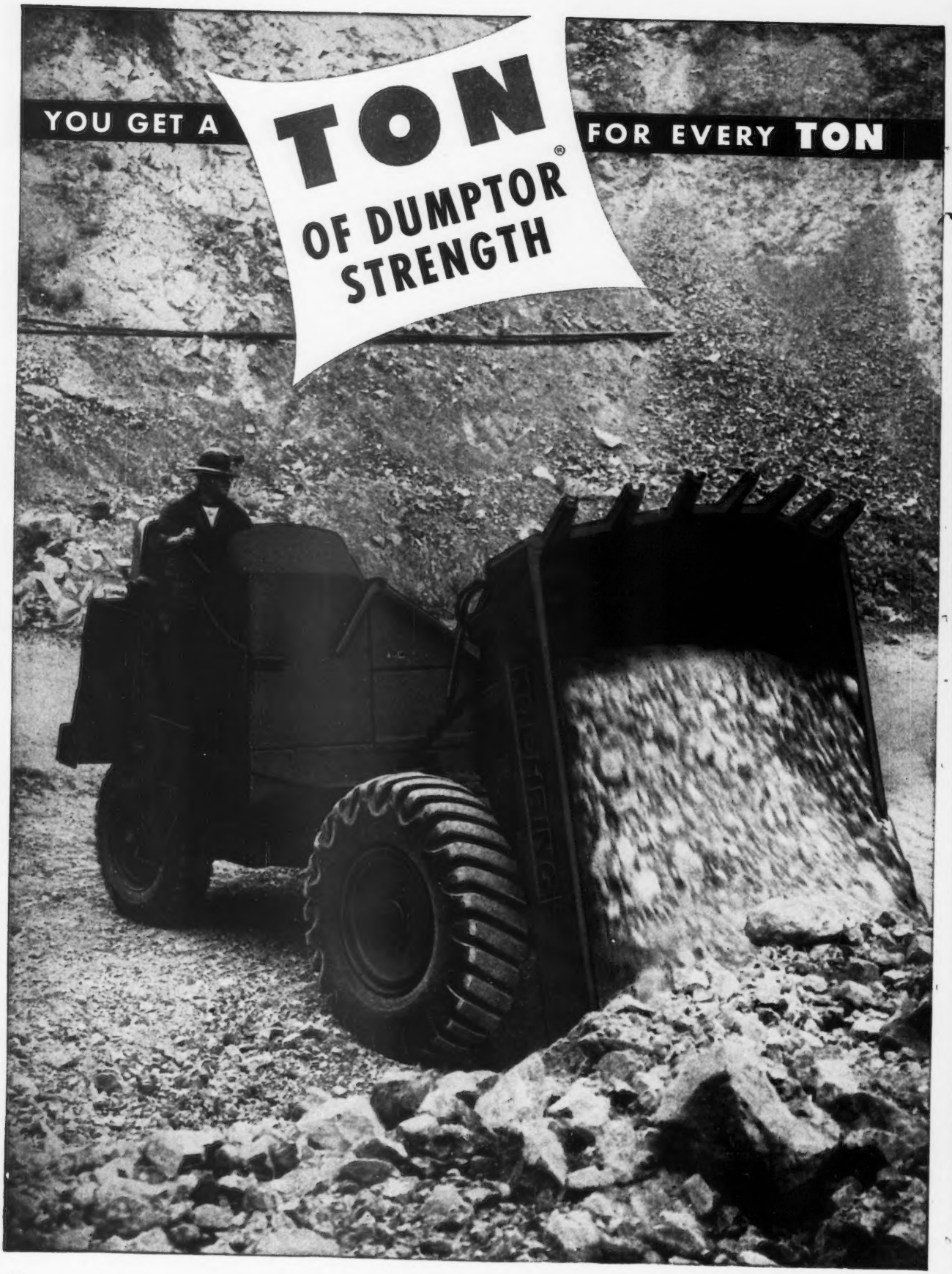
Their troubles ended, however, when the G.T.M.—Goodyear Technical Man—recommended EMERALD CORD Hose. This super-tough, horizontal-braided, "Adhezo"-bonded hose takes the rough treatment in stride—lasts for months—is now part of the specifications. For similar help on hose, see your Goodyear Distributor and the G.T.M., or write Goodyear, Industrial Products Division, Akron 16, Ohio.

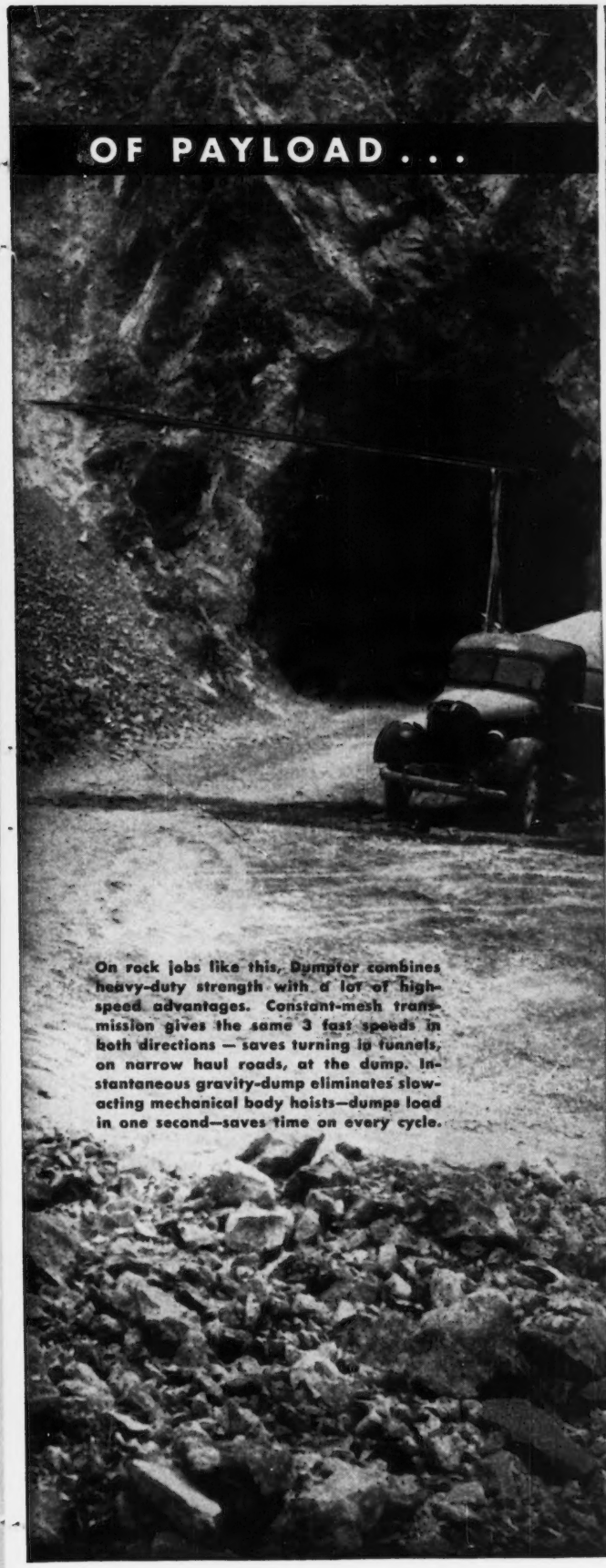
YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the Yellow Pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network


YOU GET A
TON
OF DUMPTOR®
STRENGTH
FOR EVERY TON



On rock jobs like this, Dumptor combines heavy-duty strength with a lot of high-speed advantages. Constant-mesh transmission gives the same 3 fast speeds in both directions — saves turning in tunnels, on narrow haul roads, at the dump. Instantaneous gravity-dump eliminates slow-acting mechanical body hoists—dumps load in one second—saves time on every cycle.

When you're loading ½ to 2½ yards of rock at a pass, your hauling units need plenty of strength to last. With Koehring heavy-duty Dumptor, there's more than a ton of net vehicle weight for every ton of payload capacity. Sides, ends and bottom of all-welded body are heavily-reinforced with 5 and 8" channel ribs. Double-strength multiple rib-reinforced bottom cushions shocks of rock loading. Stationary or free-swinging kick-out pan adds another ½" steel plate to Dumptor bottom for extra protection.

There's plenty of strength, too, in the Dumptor chassis to take the constant pounding of heavy loading and rough off-road hauling. Rigidly-trussed 8" ship channels make up the main frame. 4" heat treated alloy steel drive axles are protected by one-piece cast-steel housing. "I"-beam steering axle is cast alloy steel. There are no leaf springs — just one big, double-coil chassis spring on the steering axle — none on drive axle. Big drive tires eliminate the need for more springs — absorb loading and hauling shocks, save spring maintenance.

Even with all this heavy-duty construction, Koehring Dumptor has over 6 HP per ton of loaded weight — accelerates fast, pulls through soft ground and up grades with less shifting — climbs 24% grades fully loaded. See what these Dumptor advantages can mean in more work-time, less down time on your jobs. Call Koehring distributor for full details, or send for catalog.

KOEHRING Company

Milwaukee 16, Wisconsin

Subsidiaries: JOHNSON • PARSONS • KWIK-MIX

K340

Another J&L First—

SpringKore WIRE ROPE

Combines Flexibility and Crush Resistance

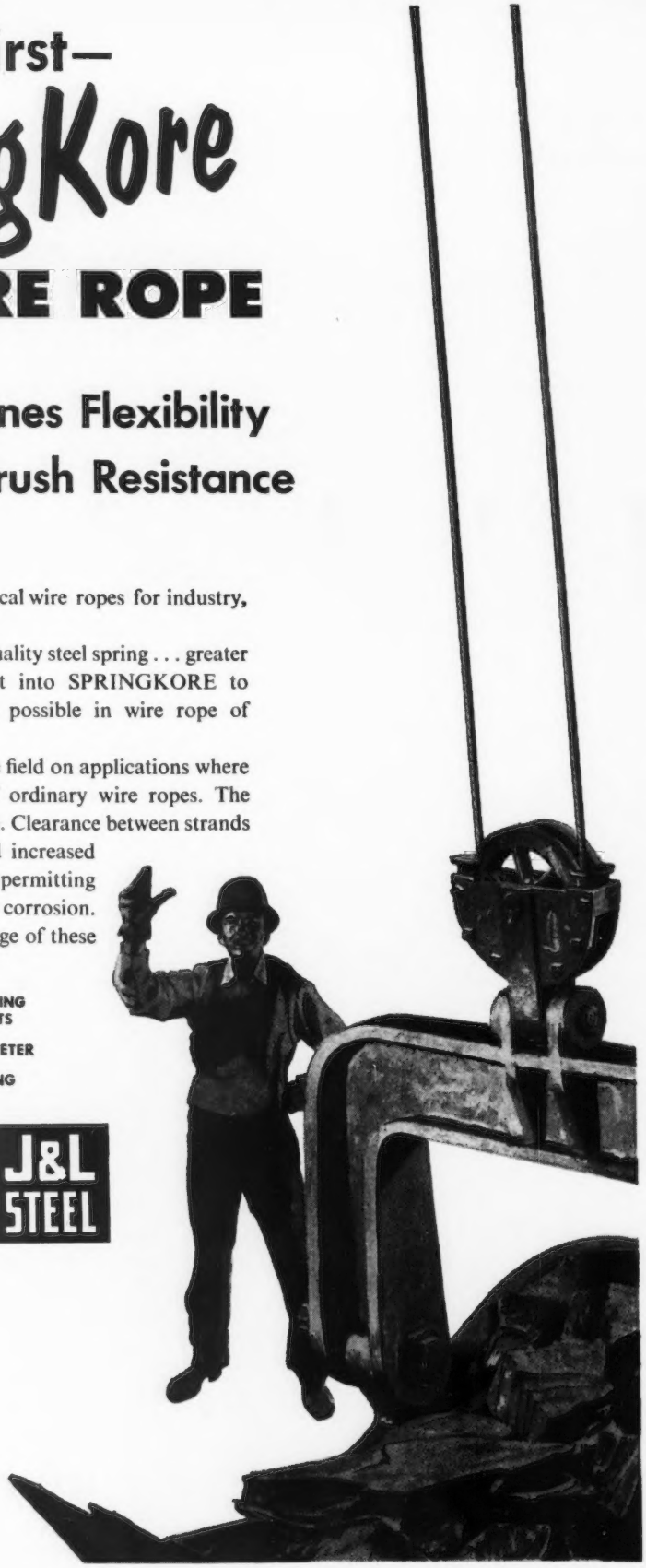
Always working to develop better, more economical wire ropes for industry, J&L has scored another first—SPRINGKORE.

The unique properties of a tightly coiled high quality steel spring . . . greater flexibility and resistance to crushing—are built into SPRINGKORE to provide resiliency and toughness never before possible in wire rope of equivalent strength and cost.

SPRINGKORE has *already* proved itself in the field on applications where heavy crushing action limits the service life of ordinary wire ropes. The diameter stays uniform for a longer period of time. Clearance between strands is maintained resulting in greater flexibility and increased fatigue life. The coiled spring forms a reservoir permitting excellent lubrication to reduce internal wear and corrosion.

Specify new SPRINGKORE and take advantage of these dollar-saving features:

- LONG TERM FLEXIBILITY
- RESISTANCE TO CRUSHING ACTION
- COMPLETE LUBRICATION
- MORE SUPPORTING CONTACT POINTS
- UNIFORM DIAMETER
- BETTER SPOOLING
- LESS INSIDE STRAND WEAR



Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

J&L STEEL

For further information, write for J&L's new booklet, "New Wire Rope for Industrial Uses."

Jones & Laughlin Steel Corporation
3 Gateway Center, Dept. 412, Pittsburgh 30, Pa.

Please send me a copy of your booklet, "New Wire Rope for Industrial Uses."

Name_____

Company_____

Address_____

INSIDE and OUT...

The Allis-Chalmers HD-15 now offers a choice of two outstanding drives — standard transmission with time-saving shift pattern, or optional hydraulic torque converter drive.

Allis-Chalmers is your BEST tractor buy

Allis-Chalmers tractors are truly modern — new from the ground up, without compromise anywhere in design or material. Built to meet today's demands, users find them more productive, more reliable, easier to operate.

Just check the advantages they offer you: — 1,000-*hour lubrication periods* on truck wheels, idlers, support rollers . . . *all-steel, one-piece welded main frame* that offers longer tractor life . . . *A-type truck frames* pivot to permit free track oscillation . . . *double reduction final drives* with more clearance and shorter shafts that resist deflection . . . *unit construction* for quick, easy disassembly . . . *lubrication points easily accessible* . . . *easy operating controls.* Add 'em up, you'll know why — Allis-Chalmers tractors are your best buy.

MODEL	HP.	WT.
HD-20	175 net engine*	41,000 lb.
HD-15	109 drawbar	27,850 lb.
HD-15	135 net engine*	28,300 lb
HD-9	72 drawbar	18,800 lb.
HD-5	40 drawbar	10,500 lb.

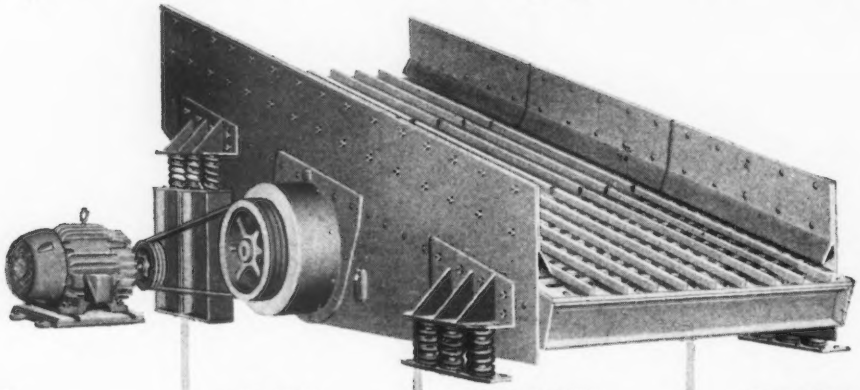
*with hydraulic torque converter drive

Ask your Allis-Chalmers dealer to show you these tractors at work. Let him demonstrate how this modern design out-performs under actual job conditions.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Heavy-duty scalping's BIG 4

...your assurance of top performance



1 GREAT STRENGTH

Massive frame utilizes heavy-section ship channels and H-beam members. Welded deck is securely riveted to thick side plates. This stress-relieved construction easily withstands up to 40-in. boulders dropped from feeder.

2 HIGH CAPACITY

Efficient vibrator mechanism permits screening extremely high capacities of sticky ore. Deck can be perforated plate or grizzly.

3 EFFECTIVE SEPARATION

All vibration is isolated from foundation by large, square-end helical springs and concentrated in the live deck for thorough action of the deepest bed.

4 TROUBLE-FREE OPERATION

Automatic controls limit motion during acceleration and deceleration. Over-size, self-aligning, taper-bore roller bearings with hydraulic bearing removal device insure long life and ease of maintenance.

New LINK-BELT vibrating screen combines all the features essential to low-cost ore handling

HERE'S the ruggedness of a grizzly teamed with the proved efficiency of a vibrating screen. Developed by Link-Belt to meet every requirement of the Range—it's the ideal answer for heavy run-of-pit applications.

Your Link-Belt representative can give you complete information on this new heavy-duty scalping screen. Contact him today, or write for your copy of Folder 2461.

LINK-BELT

VIBRATING SCREENS

Note the size of the large boulder handled by 5 x 14 ft. Link-Belt heavy-duty scalping screen at a mining firm's Mesabi plant.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, Duluth 2, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 13,324

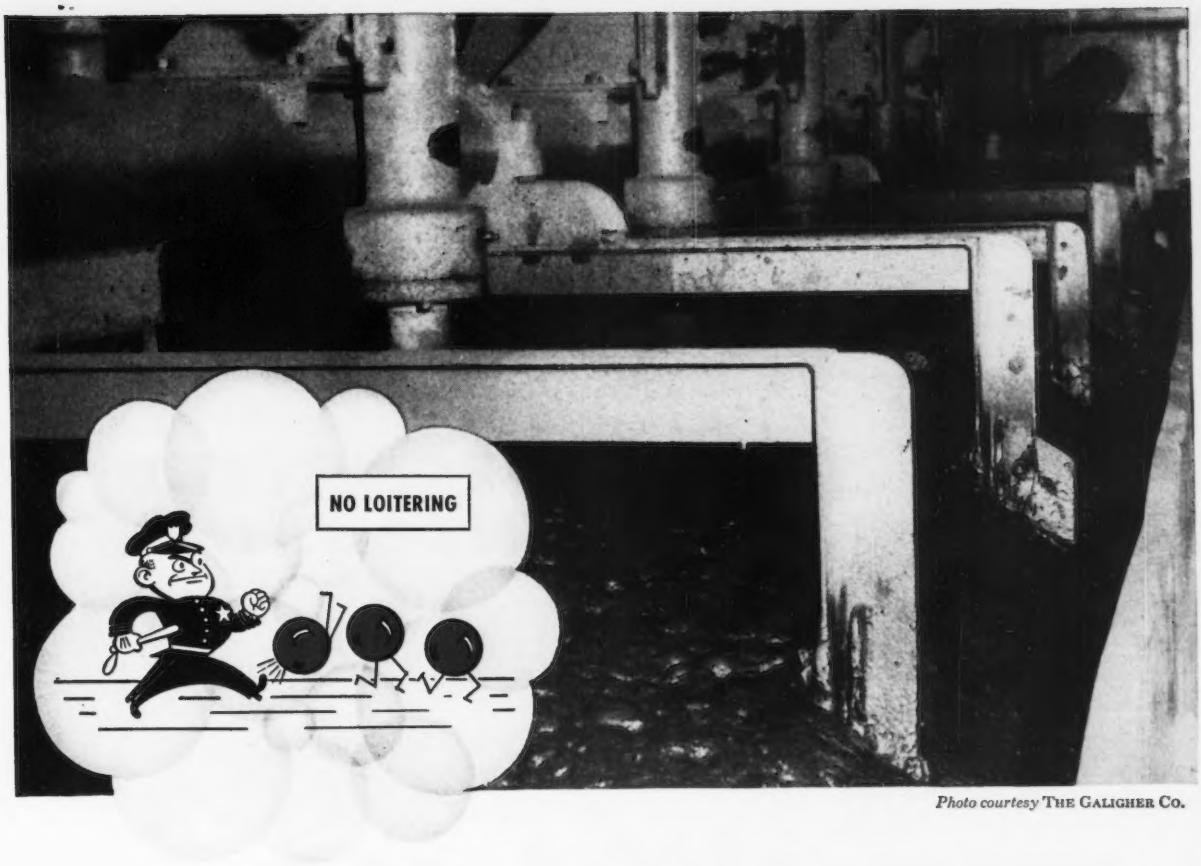


Photo courtesy THE GALIGHER CO.

Keep your bubbles moving

Keeping flotation cell bubbles moving is the way to low-cost milling operation. Overflowing solution blocks that way by damaging power cables. Damaged cables stop power, motors, bubbles, and profits.

Simplex-ANHYDREX Cables help reduce overflow damage with their specially compounded neoprene jackets. These jackets are highly resistant to alkalies, sludges, and oils that spill over the launder. That means these cables last longer and, therefore, cost you less per ton of ore handled.

Another advantage of these cables is the Anhydrex insulation. It has a guaranteed maximum water absorption of 20 milligrams per square inch. Even when completely submerged, it will retain its physical and electrical properties indefinitely.

With about one quarter of your total milling cost going for electric power, it makes sense to use the most dependable cables you can buy. Simplex-ANHYDREX Cables have that long life and dependability you are looking for. If you want to know more about how ANHYDREX helps to keep bubbles moving, write to the address below.

Simplex–ANHYDREX

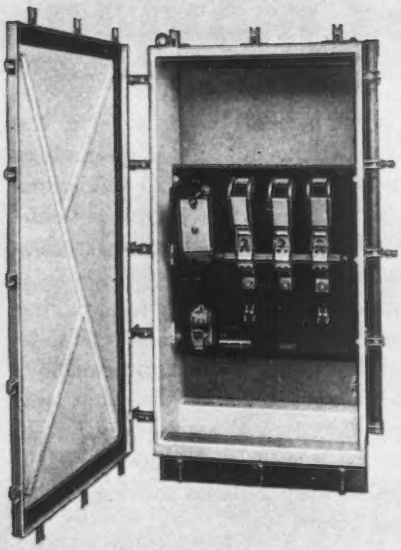
SIMPLEX WIRE & CABLE COMPANY

79 Sidney St., Cambridge 39, Massachusetts

SPECIALIZED CONTROL for a ROUGH TOUGH JOB

ALLIS-CHALMERS

CONTROL



400-horsepower, 440-volt controller for squirrel-cage motor or primary of wound-rotor motor. Dust-tight enclosure.

Custom-Engineered Protection for Motors Driving Crushers

PROTECTING A MOTOR driving an ore or rock crusher is a particularly complex control problem. In crushing, motor burdens (resulting from high inertias or extreme fluctuation of loads) dictate protection far beyond that provided by standard controllers. Only control engineered for your specific job can provide adequate protection.

An Allis-Chalmers control application starts with expert analysis of your problem by an A-C representative. Type of crusher, specific crushing conditions, and cost weighed against lost production are all factors in determining the kind and degree of protection he will specify. All recommendations are backed by complete research and testing facilities . . . by unsurpassed skill and experience in design, manufacture and application. For complete information, call your nearby A-C representative or write for Bulletin C53-424, Allis-Chalmers, Milwaukee 1, Wis.

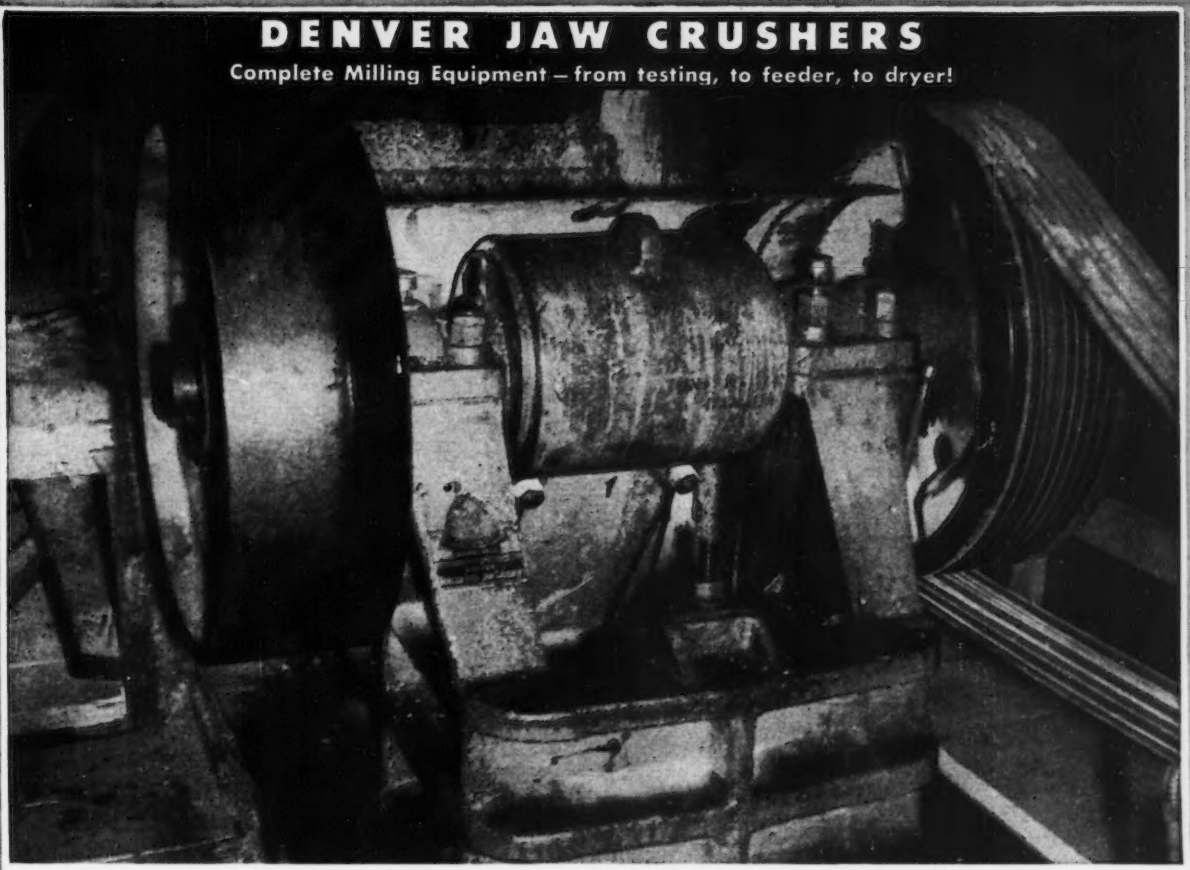
A-4306

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

DENVER JAW CRUSHERS

Complete Milling Equipment – from testing, to feeder, to dryer!



Denver Type 'H' Jaw Crushers Eliminate 95% of Your Crusher Bearing Troubles. The Reason: Anti-Friction Bumper Bearings

Bronze bumper bearings in low-cost crushers have always been a source of trouble. Deco has eliminated these difficulties and still remained in the moderate price field with the Denver Type "H" Forced Feed Jaw Crusher.

ANTI-FRICTION BUMPER BEARING

A heavy-duty roller bearing has been designed into the bumper, the most serious zone of bearing trouble. (Deco research engineers found 95% of all crusher break-downs were caused by failure of old-fashioned bumper bearings.) Also, a large diameter alloy steel shaft reduces shaft deflection on the bearings, this gives longer bearing life.

CAST STEEL FRAME

Frames on the 8″ x 10″ and larger sizes of the Denver Type "H" Crusher are electric cast steel. The frame is also heavily reinforced to withstand severe service.

OTHER CONSTRUCTION FEATURES

Jaw plates are reversible 13%-14% manganese steel. The bumper is heavy, electric cast steel. Grease fittings are conveniently located, and bearings are sealed against dirt.

SIZES

Denver Type "H" Forced Feed Jaw Crushers are available in sizes 2¼″ x 3½″, 3¼″ x 4½″, 5″ x 6″, 8″ x 10″, 10″ x 16″, 10″ x 20″, and 11″ x 30″. Shipment of most sizes is normally made direct from stock, so you can get immediate delivery!

BIG CRUSHERS, ALL ANTI-FRICTION BEARINGS

Denver Type "J" Jaw Crushers—with both anti-friction bumper and side bearings, and one-piece steel frame are available from 9″ x 12″ through 32″ x 40″.

Write or wire today—find out how you can get maximum jaw crusher service by using a Denver Jaw Crusher!

Free Technical Bulletin Sent On Request

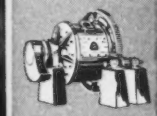
Over 25 years of Flotation Engineering

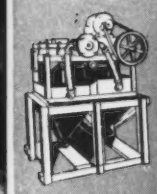
DENVER EQUIPMENT COMPANY

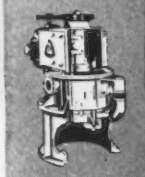
1400 SEVENTEENTH ST. DENVER 17, COLORADO

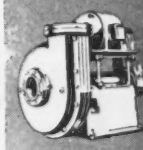
DENVER DISC FILTER

DENVER JAW CRUSHER


DENVER STEEL HEAD BALL MILL


DENVER MINERAL JIG

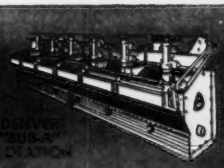

DENVER VERTICAL PUMP

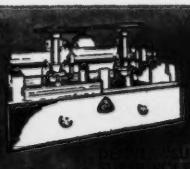

DENVER SRL PUMP

DENVER AUTOMATIC SAMPLER

DENVER STEEL HEAD ROD MILL

DENVER ORE FEEDER


DENVER "SUB-A" FLOTATION


DENVER "SUB-A" SUPER DUTY CONDITIONER FLOTATION MACHINE

DENVER AGITAIR AND CONDITIONER

DENVER "SUB-A" UNIT CELL

DENVER DIAPHRAGM PUMPS

DENVER DILLON SCREEN

Spend less time changing bits more time drilling

TIMKEN® ROCK BITS ARE INTERCHANGEABLE

NO need to waste valuable drilling time switching steels. With Timken® interchangeable rock bits, you can switch quickly from one bit type to the other —right on the job. Dozens of different Timken multi-use and carbide insert bits screw right on the same threaded drill steel!

Because both Timken multi-use and carbide insert bits fit the same steel, there's no need to stock expensive double inventories of drill steels. In addition, both Timken bit types give these other two advantages: 1) made from electric furnace Timken fine alloy steel, 2) special shoulder union keeps drilling impact from damaging threads.

If you have a drilling problem, be sure to call upon our rock bit engineers. They're backed by over 20 years' experience in selecting the most economical bits for every drilling need. There's no obligation. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO."

WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

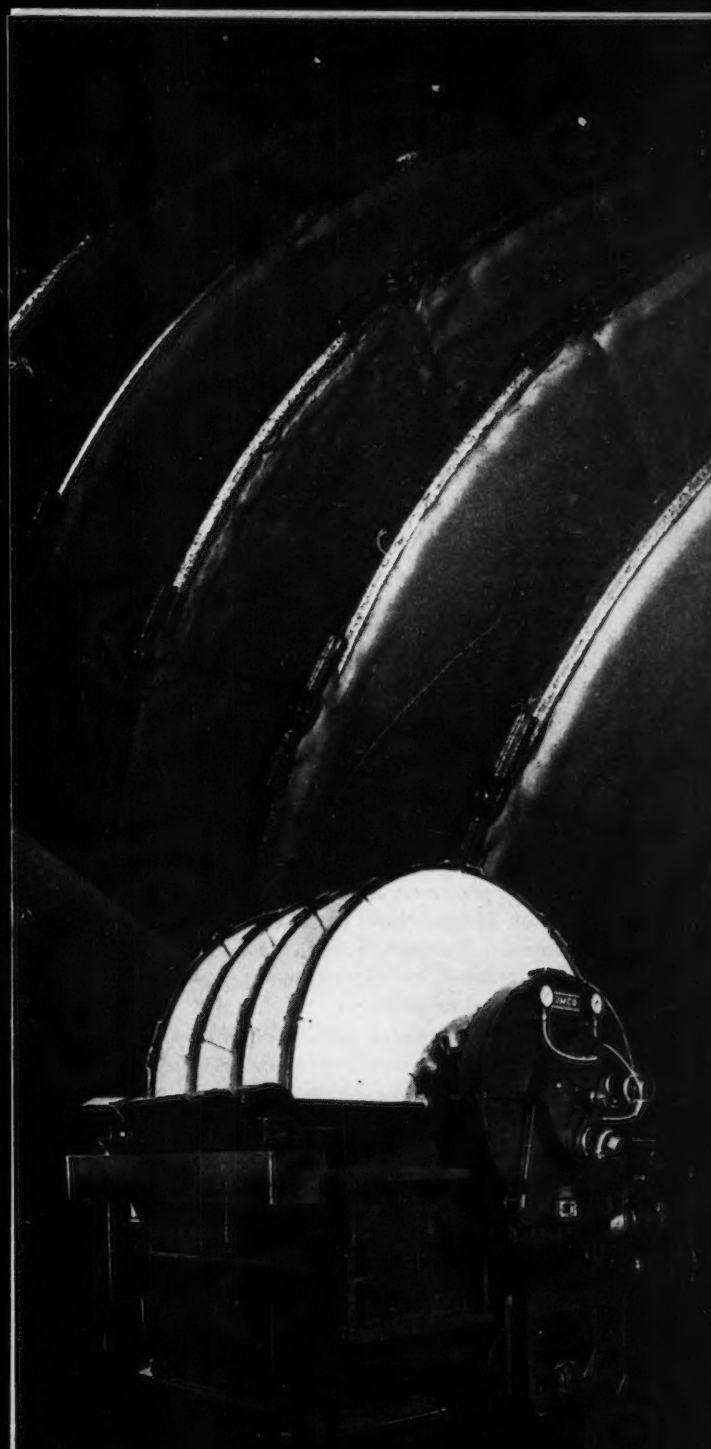
WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant-gage holes, small-diameter holes, very deep holes.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

your best bet for the best bit ...for every job



An EIMCO Agidisc Filter
8' Diameter x 4 Disc Unit

INCREASE PRODUCTION and LOWER MOISTURE CONTENT

in dewatering metallurgical slurries with fast settling solids

Two critical factors in dewatering of metallurgical slurries with fast settling particles are improved by using Eimco Agidisc Filters.

These dependable filter units have been used on many different materials with remarkable success. In the dewatering of a copper concentrate an Eimco Agidisc was installed beside a filter of standard disc design. The Agidisc produced from 20-25% more tonnage and the discharged cake contained 1½-2% less moisture.

In the same plant a metallurgical drum type filter was running on the same feed. The moisture on the Agidisc was ½ of 1% lower than on the drum filter.

Other installations are showing equally as good or better results.

Let an Eimco engineer tell you about the Agidisc. Write for a bulletin on the Agidisc to The Eimco Corporation, Box 300, Salt Lake City, Utah.

B-21

THE EIMCO CORPORATION

Export Offices: Eimco Bldg., 52 South St., New York City • Salt Lake City, Utah—U.S.A.

You Can't Beat An Eimco

No place for a motorist—yet. This photograph shows the difficulties encountered in building a road through Catskill Mountains region.

Carving a path for New York Thruway

Wagon drills make the dust fly as Bethlehem hollow drill steel bites into the limestone. This steel provides economical drilling, time after time.

One of the major problems involved in constructing a 22-mile section of the New York Thruway in the Catskill Mountains, between Ravena and Palenville, N. Y., was the removal of approximately 2,000,000 cu yd of medium-hard limestone.

The contractor for the rough grading, as well as for the paving which followed, was The Savin Construction Corp., East Hartford, Conn. In the rock-removal operations, the Savin organization used wagon drills equipped with Bethlehem hollow drill steel, 1¼ in. round, fitted with carbide-insert bits. The approximate footage drilled was 1,500,000 lineal feet, with some of the blast holes going as deep as 30 ft. The project manager, B. A. Wilder, reported satisfactory results in every way with Bethlehem Hollow.

Yes, you can always count on good performance with Bethlehem Hollow, even under the toughest drilling conditions. Bethlehem Hollow has a wide quenching range, making it easy to heat-treat for the ideal balance of hardness and wear-resistance. It makes long-wearing threads, and tough shanks. It's well able to take the fast, hard blows of modern rock drills.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

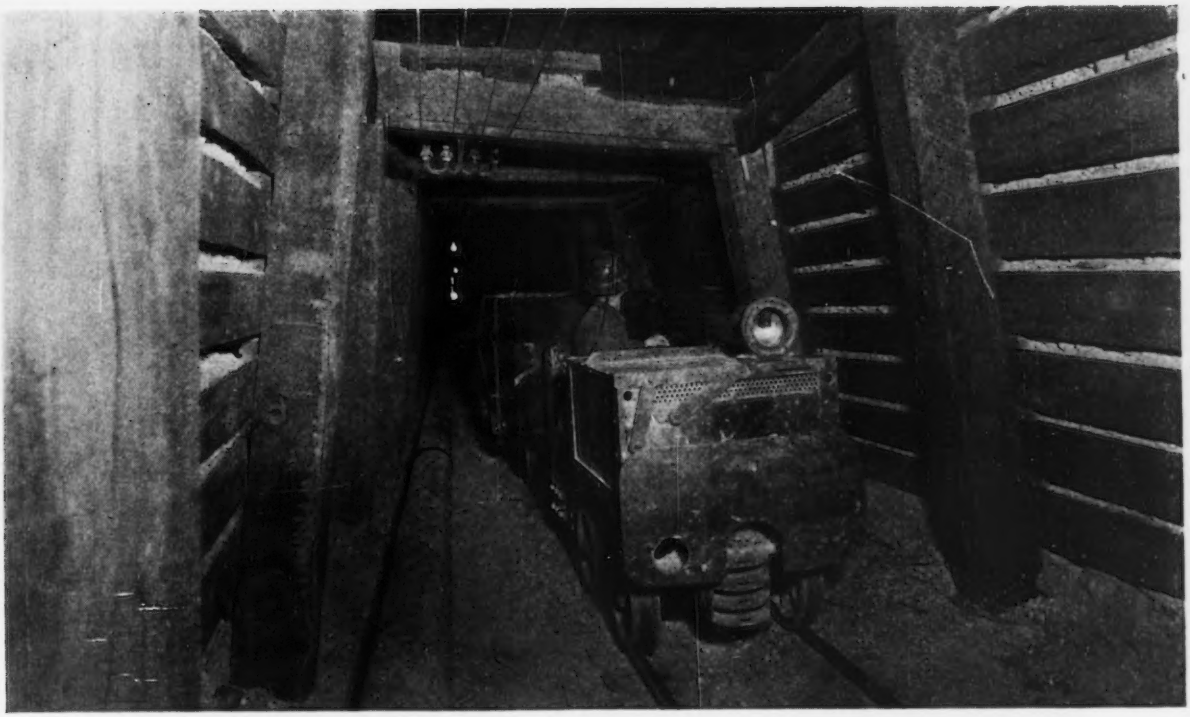
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Two Grades of

BETHLEHEM HOLLOW DRILL STEEL

CARBON • ULTRA-ALLOY (chrome-moly)

BETHLEHEM STEEL



MANCHA'S LITTLE TRAMMER

Operating wt., 1½ tons

Earns MORE . . . BECAUSE IT *saves* MORE

SAVES MAN-POWER
This powerful little storage battery locomotive does the work of a whole crew of hand trammers, and releases men for profitable labor.

SAVES TIME — CUTS LABOR COSTS
Payroll savings effected by the use of Mancha's Little Trammer are often enough to write off the cost of this locomotive in a very short time, because it not only hauls ore but can also be used to handle mine supplies.

SAVES MAINTENANCE EXPENSE
Years of development and perfecting in actual mine service have made Mancha's Little Trammer virtually trouble-free. Simple design, rugged construction make inspection easy, repair seldom necessary.

Important savings are assured, too, through the use of genuine Mancha replacement parts for the Little Trammer — or any Mancha Storage Battery Locomotive. Mancha-made parts meet rigid standards for fit, material, and workmanship. There is no variation. Their use is your guarantee of quick installation and continued long life.

Will a Mancha's Little Trammer pay in your mine?

You can find out easily and quickly. Send in the coupon for our "mine haulage data form." With the information you furnish, we can tell you how a Little Trammer can help you save money. So, whether or not you are in the market today, send the coupon and get valuable haulage data you can use now or tomorrow. There's no obligation.

Mancha Storage Battery Locomotive
Division **GOODMAN** *Manufacturing Company*
4850 South Halsted Street, Chicago 9, Ill., U.S.A.
E & MJ - 454
Send your mine haulage data form.

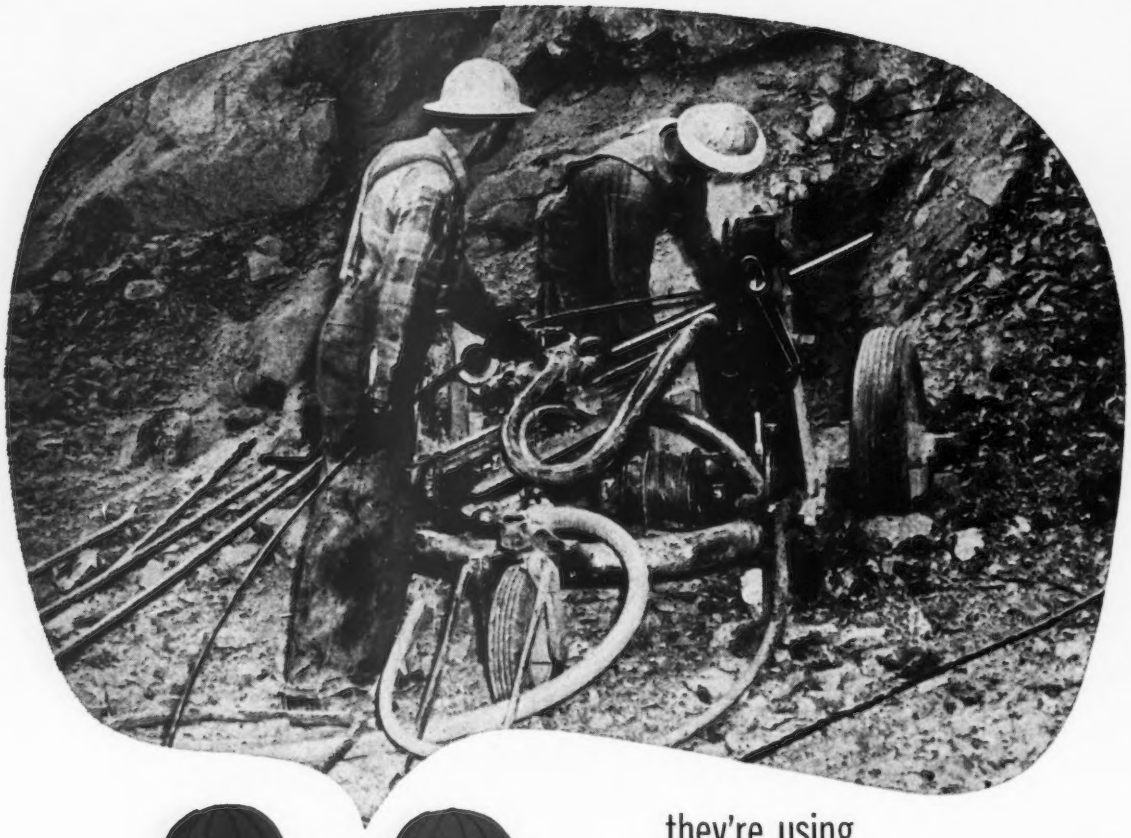
NAME _____

FIRM _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

MANCHA STORAGE BATTERY LOCOMOTIVE
Division **GOODMAN** *Manufacturing Company*
4850 SOUTH HALSTED STREET CHICAGO 9, ILL., U. S. A.



they're using CRUCIBLE HOLLOW DRILL RODS on the New York State Throughway

This new high-speed superhighway will, when completed, speed streams of traffic across New York State from New York City to Buffalo.

It's a big, difficult construction job on which thousands of tons of rock must be moved. That's why you will find Crucible Hollow Drill Rods in use all along the route. Experienced construction men know they can rely upon the performance of these rods under the toughest field conditions.

There is a good reason for the dependability of Crucible Hollow Drill Rods . . . they are made to *tool steel* standards, by the leading producer of tool and special purpose steels. And this *extra* quality means fewer broken rods and lost bits. *For lowest cost per foot of hole drilled* — specify Crucible Hollow Drill Rods.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

HOLLOW DRILL ROD

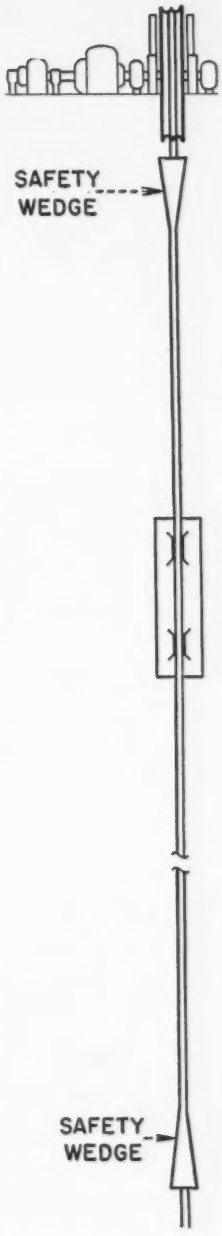
CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

- **Increased safety**
- **Mounting of hoist in headframe**
- **Lower power**
- **Less rope wear**
- **Lower peak power demand**
- **Less weight and volume**

Are all possible, says ASEA of Sweden, with their

Friction Drive Type Mine Hoist



Introduction of "new and revolutionary concepts" in friction drive hoists with their multiple-rope principle is claimed by Swedish Electric Co. ASEA, who say that the principle offers the choice of independent operation of single skips and cages with counterweights and fully automatic operation over the use of cylindrical drum hoists.

In an ASEA hoist, two or more hoist ropes are used in parallel to increase operational safety, and the ropes are taken around a driving pulley only once, so that the arc of contact between ropes and pulley covers only a part of the circumference. The same ropes join the skip or cage and the counterweight (or two skips or cages) in balanced operation and the friction between the ropes and the pulley is sufficient to impart driving and braking force.

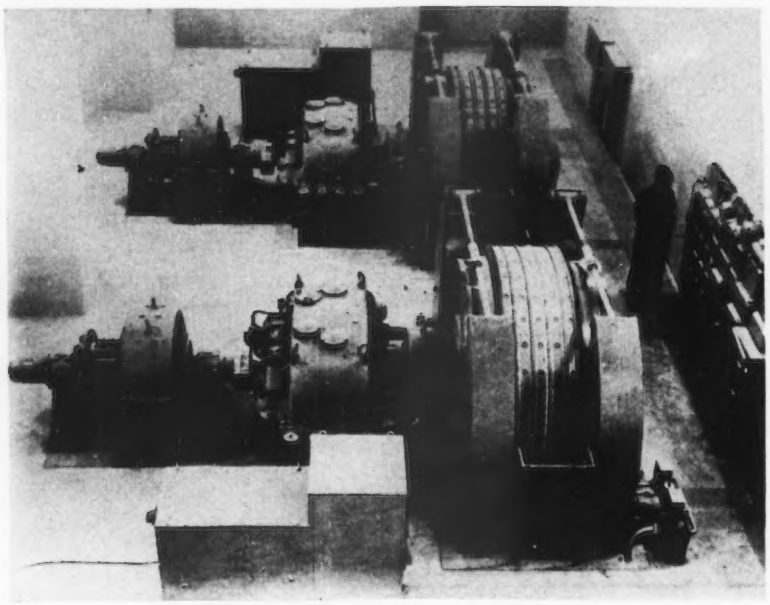
The fact that rope slip will occur if the ratio between loads exceeds the limiting value is utilized to gain additional safety and prevent undue wear in case of overwinding the hoist. Wooden safety wedges, at the top and bottom of the shaft guides, give an increasingly tighter grip in proportion to the overwinding of the hoist. The bottom skip or cage (or counterweight) enters the wedges first and consequently releases the stress on the ropes on one side. This causes the rope to slip on the drum and prevents damage to any of the parts.

Peak power demand is reduced to a low value with the use of balancing tail ropes, common to friction-drive hoists, which is usually of the same weight per unit length as the hoist ropes. The tail rope may be a single, flat rope even when the hoists ropes number two, three or four—and since it carries only its own weight, its service life is long. According to ASEA, the use of a tail rope to balance the weight of the hoist ropes reduces the peak power demand to such a low value that flywheels are seldom needed.

The most interesting advantage of the friction-drive principle is the fact that several ropes can be used instead of a single one. Since the rope is taken around the pulley only once, there may be several smaller ropes side by side, dividing the load betwen them.

If, at given figures for hoist capacity, shaft depth and safety factor, four parallel ropes can be used, the diameter of these parallel ropes becomes only half as large as a single rope. Thus the drum diameter may be reduced by half and the length of the drum reduced as well, since it need only accommodate four turns of rope. Total reduction in weight and inertia is significant.

With the smaller drum, hoisting speed is increased and torque halved,



Four parallel ropes in operation on a hoist in Sweden.

permitting the use of a high speed motor (in direct drive) or lower gear reduction ratio (with geared drive).

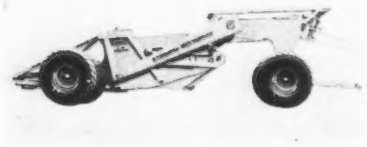
These drastic reductions in the weight and volume of the hoisting machinery make it practicable to install the hoist in the headframe directly above the shaft. The reduction of inertia of all rotating parts also results in lower peak power demands, smaller hoist motor ratings and more advantageous dimensions of brakes.

Thus, says ASEA, costs are considerably reduced with the cuts in size, weight, inertia and the placement of the hoist at the headframe. The latter gives further important savings with reduced tendency toward oscillation and protection of rope from weather, as well as a space saving in the ground area around the shaft.

Rope wear is reduced in a number of ways, according to ASEA: there is no fleet angle and ropes are protected from the weather when hoist is mounted in the headframe. S-bends are very slight or totally absent, and crossovers in multi-layer winding practice are avoided.

Adaptability to hoisting from several levels, increased capacity of hoists and a hoisting reserve for emergencies may be acquired with independent operation of single hoists in the shaft with counterweights.

ASEA friction-drive hoists will be operating at a mine in this country in 1954, according to AROS Electric Inc., 16 E. 71st St., New York 21, N.Y., sole U.S. agents for the Swedish firm, and in Canada in 1955. **(1)**

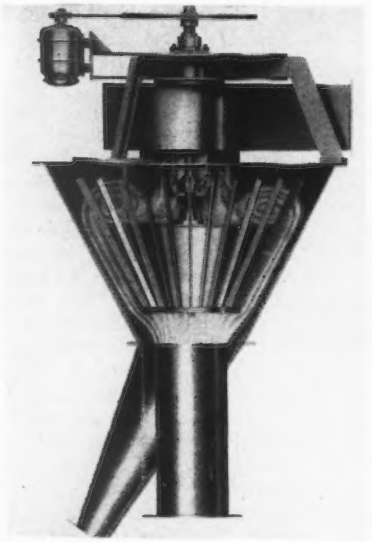


RUBBER-TIRED SCRAPERS

A new line of open-top, tractor-drawn, rubber-tired scrapers, ranging in capacity from 10.5 to 28.5 cu yd, is announced by LeTourneau-Westinghouse Co., Peoria, Ill. **(2)**

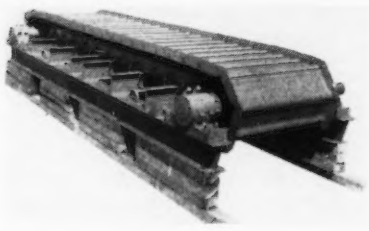
CRANE OR SHOVEL

Lima Type 44 is a one-cubic yard shovel or 25-ton capacity crane, and can be used for dragline or clamshell operations. Shovel has 18-ft boom with 18-ft dipper stick. Crane booms are available up to 100 ft with 15-, 20-, and 30-ft jibs for additional length. Baldwin-Lima-Hamilton Corp., Lima, Ohio. **(3)**



AIR CLASSIFIER

Hardinge Co., Inc., York, Pa., announces the "Gyrotor" air classifier, for continuous separation of coarse and fine air-borne particles. Can be used in closed circuit with pulverizing unit or as a self-contained sizing unit for any moving stream of air-solids mixture. This new type classifier is basically an inverted, truncated-cone shell with a motor-driven bladed rotor of similar shape revolving on a vertical center axis inside the outer shell. Feed passes upward from the bottom through the annular space occupied by the whirling blades, describes a doughnut-shaped motion above the rotor, and discharges through a central opening in the top. Oversize not removed by the blades drops out in the eddy current above the rotor and centrifugal action deposits it on the outer shell where it slides to the oversize discharge at the base. Returning oversize is claimed to be definitely cleaned of fines due to winnowing action of the blades. Rotor speed controls product size. **(4)**



APRON FEEDERS

Extra heavy duty 9-in. pitch apron feeder is available in 36, 42, 48, and 60-in. width. Manganese flights are optional. Special features promise longer life, smoother operation, and easier maintenance. Complete specifications, dimensions and construction details are given

TACONITE...
and Symons® Cone Crushers

● SYMONS® CONE CRUSHERS . . . *the machines that revolutionized crushing practice* . . . have long proved their efficiency, dependability and economy in the profitable reduction of ores and minerals the world over. In the case of *TACONITE,* one of the hardest and toughest of all ores to process, the mining fraternity again depends on Symons Cone Crushers for the economical production of large tonnages of Taconite Iron Ore . . . as evidenced by the many Symons Cones in successful service, or on order, for the leading producers of Taconite Iron Ore in Norway and in the Lake Superior Iron Ore region.

While *your* crushing problems may not involve Taconite, you may be sure that the crushers used for processing this extremely hard material are the logical choice for practically any other large capacity ore and mineral reduction job.

NORDBERG MFG. CO., Milwaukee, Wisconsin C254

SYMONS . . . *A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD*

SYMONS PRIMARY GYRATORY CRUSHERS | MINE HOISTS | GRINDING MILLS | SYMONS VIBRATING GRIZZLIES and SCREENS | DIESEL ENGINES

View shows two of several 7' Symons Super Heavy Duty Short Head Cone Crushers installed in the Lake Superior region.

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

Standard Engineer's Report

CASE HISTORY

PRODUCT Calol Vistac Oil

FIRM Victorville Lime Rock Co., Victorville, Calif.

One grade of oil ends desert heat-range problems!

CALOL VISTAC OIL 14X is the only lubricant tried that stays on pistons and other air-tool parts in spite of extreme temperature changes at the Victorville Lime Rock Co.'s quarry at Victorville, Calif. Temperatures range from 0°F. to 120°F. in this desert area, often change as much as 75° from early morning to afternoon. Oils previously used failed to stay in place except in a narrow range of temperature. Calol Vistac Oil 14X prevents excessive wear, sticks on bearing surfaces and helps keep them clean although tools constantly work in heavy abrasive dust around drills above.

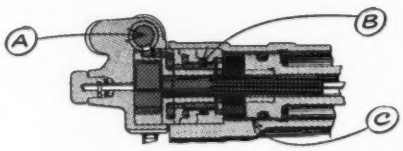
REMARKS: Quarry is in natural deposit of exceptionally pure calcitic limestone. Rock is ground to fine calcium carbonate, used for paint fillers and extenders, and for many other applications.

FREE CATALOG: "How to Save Money on Equipment Operation" will be sent on request to Standard Oil Company of California, 225 Bush Street, San Francisco.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your distributor, write or call any of the companies listed below.

CALOL

How CALOL Vistac Oil cuts cost in air-tool equipment



A. Atomizes quickly and completely—carries evenly over all parts. Does not fog excessively and has no unpleasant odor.

B. Additives help form tenacious oily, pressure-resistant film in wet or dry conditions—cuts wear and power loss. Small quantity lubricates efficiently.

C. Resists high temperatures and oxidation. Stays fluid at low temperatures.

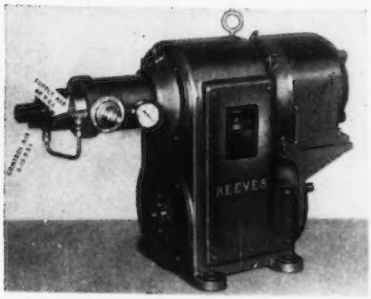
TRADEMARK "CALOL" REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

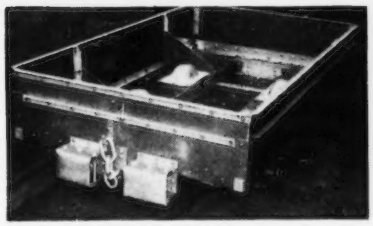
STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

in Bulletin No. U536. Universal Engineering Corp., Cedar Rapids, Ia. **(5)**



MOTORDRIVE CONTROL

"Conoflow" control is available on all Reeves Vari-Speed motordrives for use with instrumentation air pressure of 3 to 15 psi. Permits the motordrives to control liquid levels in open or enclosed tanks, and to automatically control flow-proportioning systems of liquid, gas or chemicals, as well as temperature and pressure. Reeves Pulley Co., Columbus Ind. **(6)**

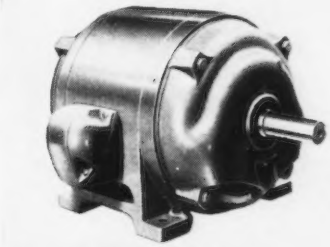


ALUMINUM MINE CAR

A corrosion-resistant aluminum mine car with a body weight of only 1614 lb, in contrast with a body weight of 4417 lb for a similar car made of steel, has been developed jointly by Enterprise Wheel & Car Corp., Bristol, Va., and Reynolds Metals Co., Louisville, Ky. **(7)**

BEARING PACKER

Heavy duty bearing packer operates with ease and speed from original grease containers. Handles bearings from ¾-in. ID to 7½-in. OD (small end). Gray Co., Inc., Minneapolis, Minn. **(8)**



ELECTRIC MOTOR

U. S. Electrical Motors Inc. has announced a new motor with numerous new features, conforming in every respect with NEMA specifications. One outstanding feature is its complete drip-proof design which also offers splash-proof protection without increased cost. **(9)**

HYDRAULIC CABLE CUTTER

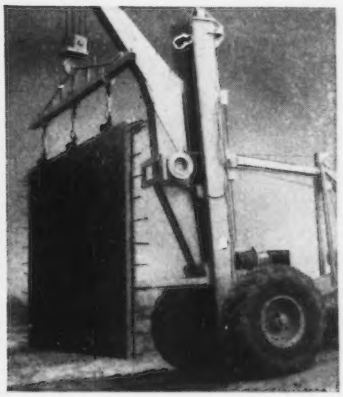
A handle pull so easy a small boy could operate it, is the feature of this hydraulic cable cutter with a capacity up to 3½ in. Requires no stooping and only 7 handle strokes per inch. Weighs 30 lb. H. K. Porter, Inc., Somerville, Mass. **(10)**

SIDE DUMP TRAILER

Model TP-810 is the smallest side-dump pan type trailer manufactured by Easton Car & Construction Co., Easton, Pa. Capacity is 8 cu yd or 10 tons, de-

what's NEW in Engineering

A carbon dating process developed by the University of Manitoba is said to make it possible to date – within 10 years of actual age – any matter containing radioactive carbon from as far back as 40,000 years. A liquid scintillator is used. The material to be dated is incorporated in the liquid. There it sets up light flashes which are measured by an electronic eye. The sample is destroyed in the testing process.



Pre-cast, tilt-up walls, soil testing and analysis, uniform spacing of bays and a dead level roof all played important roles in Kaiser Engineers' research, design and construction of Westinghouse's newest – and largest – commercial lighting fixture plant. The result: a building suited in every respect for its intended purpose, and one constructed at an unusually low cost per square foot. For further information on this and other major Kaiser Engineers' projects, write us at the address below.

A cold weather blow torch, weighing just 6½ ounces, is claimed to operate efficiently at temperatures down to –70F. The torch pre-heats its own combustion air and a separate tank supplies fuel.

Widely diversified engineering talents and experience are available to every Kaiser Engineers' project. Departments include civil, structural, electrical, mechanical, architectural, process and production, mining and geology, metallurgical and chemical – and all work closely together. Call or write to Kaiser Engineers Division of Henry J. Kaiser Company, Kaiser Building, Oakland 12, California.

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WILD Optical Squares, tiny surveying instruments containing pentagonal prisms, will do the complete job of laying out and checking buildings, concrete forms, ditches, pole lines, boundaries, etc., as well as cross sections and topo maps.

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Single Pentagonal Prisms $19.00
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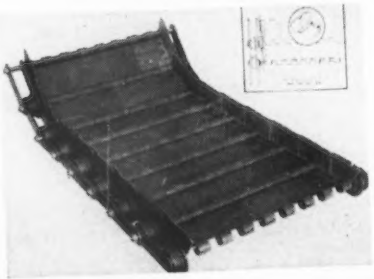
signed for shuttle service in mines and quarries. Body is welded ⅜-in. plate with box-section reinforcements and an oak floor cushion. Body may be reversed end for end to avoid excess wear on one side. **(11)**

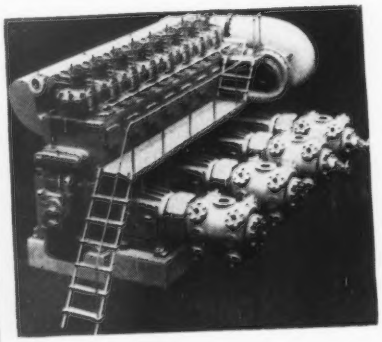


STEEL BELT LINK

May-Fran Engineering, Inc., Cleveland, Ohio, has redesigned standard component links on its steel belt to incorporate 4 interlocking flanges on each side of the link, providing greater stress distribution and permitting links to be staggered, thereby eliminating lateral movement between links and minimizing fall-through scrap. **(12)**

BEARING CALCULATOR

Convenient, circular sliding scale gives the user a quick and simple means of converting bearing capacities (load, speed and life) as required for any given application, into terms of rated bearing capacities. It selects proper bearing size for you. Aetna Ball and Roller Bearing Co., Chicago, Ill. **(13)**

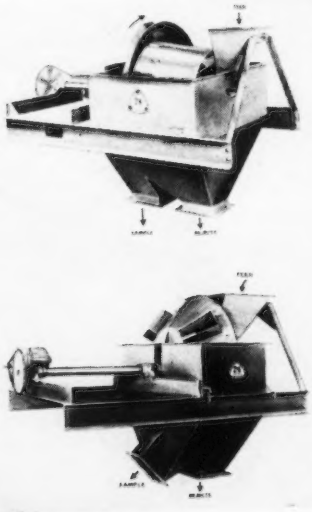


COMPRESSOR

This is Model TRA, America's first turbocharged 2-cycle, right-angle, gas-engine-driven compressor unit. Develops 1320 hp from 8 vertical in-line 14x14-in. cylinders, integrally connected to horizontal compressor cylinders. Clark Bros. Co., Olean, N. Y., say it offers 50% more power, lower fuel consumption, 25% less water cooling load and quieter operation. **(14)**

LINEAL MEASUREMENT

Calibrated wheels, trade-named "Distometer" are said to provide high speed, accurate methods of lineal measurement. Rolatape, Inc., Santa Monica, Calif. **(15)**



ORE SAMPLER

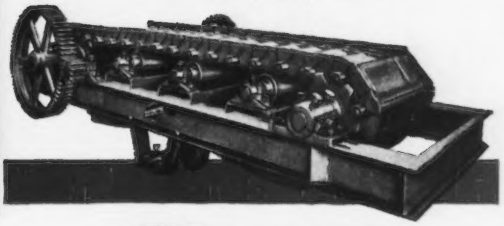
Especially designed for dry sampling where there is limited headroom, this ore sampler is a completely self contained unit of welded steel construction. Maintenance is low and cutter openings are replaceable. Denver Equipment Co., Denver, Colo., the manufacturer, offers a complete range of sizes in both simplex and tandem samplers. **(16)**

TELSMITH

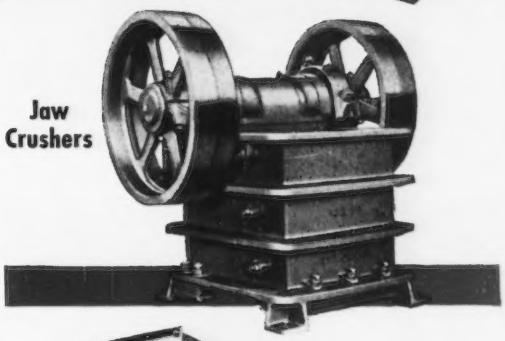
feeding
coarse crushing
screening
fine crushing
scrubbing

EQUIPMENT
FOR MINES

Heavy-Duty Feeders

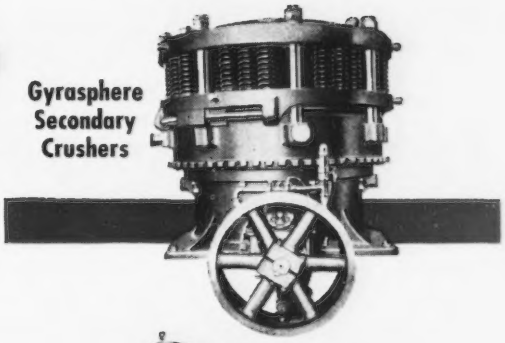


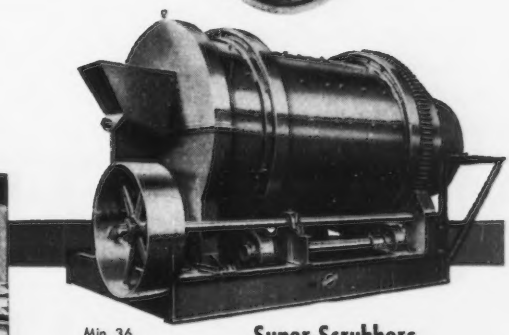
Jaw Crushers



Vibrating Screens

Gyrasphere Secondary Crushers





Min. 36

Super-Scrubbers

SMITH ENGINEERING WORKS, 502 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

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Samuel Osborn (S. A.) Ltd., Johannesburg, So. Africa • 51 East 42nd St., New York 17, N. Y. • 211 W. Wacker Dr., Chicago 6, Ill.

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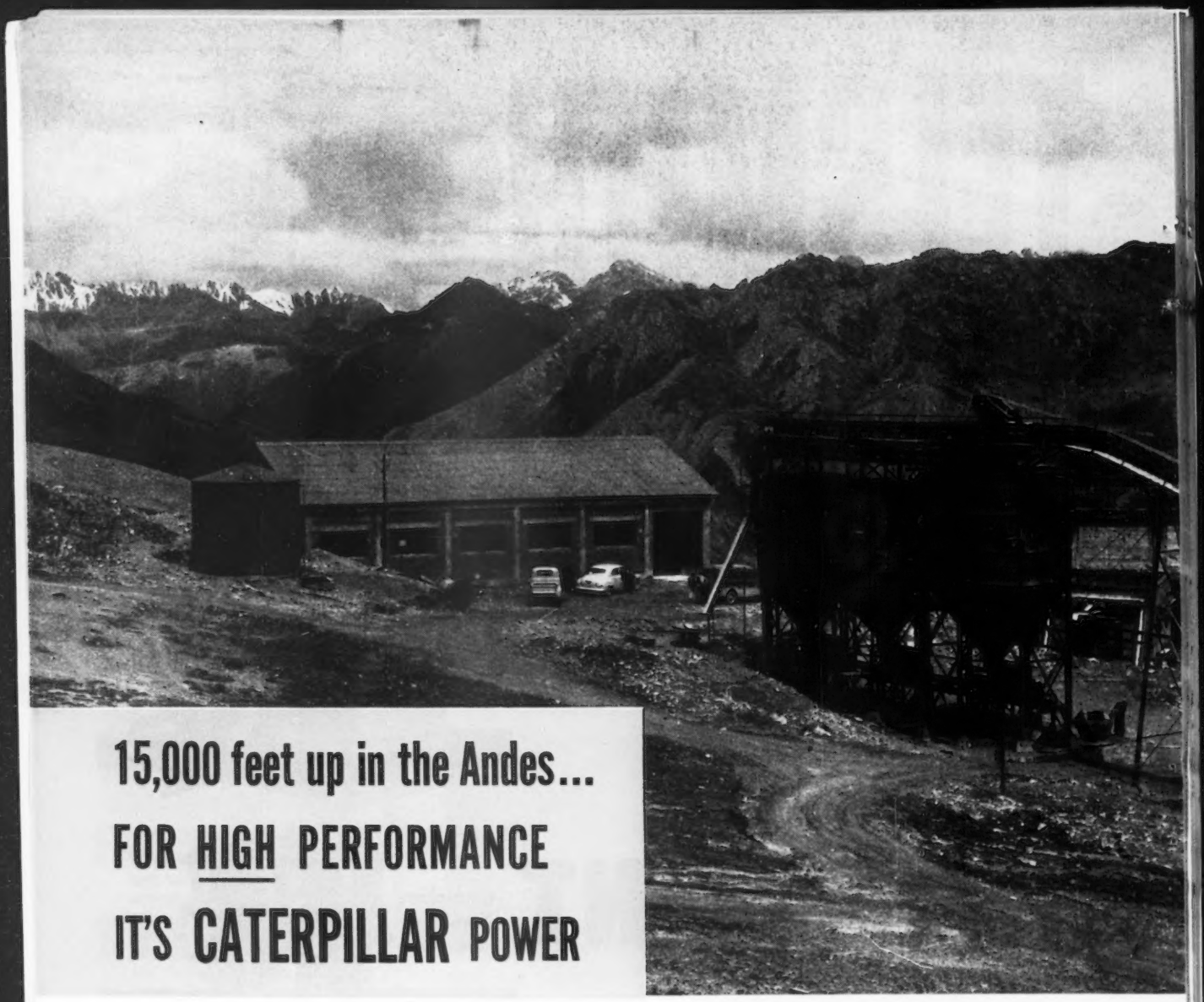
Robert S. Bailey, Los Angeles 17, Calif. • Ontario Eqpt. & Supply Ltd., Toronto, Canada • Gordon Russell, Ltd., Vancouver, B. C.



15,000 feet up in the Andes... FOR HIGH PERFORMANCE IT'S CATERPILLAR POWER

At Ticlio, Peru — 86 miles east of Lima and highest point in the world reached by road and rail — four Caterpillar D397 Electric Sets furnish all power for this operation of Volcan Mines, Ltd. They run continuously in the thin mountain air, powering a concentrate plant with a 250-ton capacity ball mill. Daily output is 400 tons of copper, lead and zinc.

A job like this is a real test of engines. For round-the-clock, high-altitude operation, they must have stamina. And they must be reliable, because the whole operation, in a remote corner of the world, depends on them.

Volcan Mines chose Caterpillar D397s for the job. These rugged Diesel Electric Sets are built to deliver without pampering or down time. Caterpillar builds years of extra service into every engine with long-wearing aluminum-alloy bearings and pistons, "Hi-Electro" hardened crankshaft journals, and precision workmanship. And Caterpillar's special fuel-injection system means full and foul-free power on money-saving No. 2 furnace oil.

There are 12 sizes of engines and electric sets up to 500 HP and 315 KW. Your Caterpillar Dealer will help you pick the right unit for your job. See him today — and count on him whenever you need fast, skilled service and genuine Caterpillar parts.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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For Your Files

This informative manufacturers' literature is free unless otherwise specified. To obtain bulletins circle their numbers on card below and mail.

FIRST AID KITS. First aid supplies of "pharmaceutically controlled quality," in a redesigned case, are features of Mine Safety Appliances Co.'s new "Type D" first aid kits. Folder gives you a good idea of what's available. **(52)**

SPAD. This 4-page folder from American Mine Supply Co., Pittsburgh, Pa., tells you how spads can do a better job of supporting brattice cloth, water pipes, air hose and telephone lines in your mine and do it faster and easier. **(53)**

PUMP. If you must pump abrasive or corrosive solution without gland water, Allen-Sherman-Hoff Pump Co., Wynnewood, Pa., shows you an efficient way to do it in this 4-page folder. **(54)**

TUNGSTEN CARBIDE. "Sinterforge Components" will tell you all about the variety of made-to-order carbide shapes and sizes which may be manufactured to your specifications by Sintercast Corp. of America, Yonkers, N. Y. **(55)**

TWO WAY RADIO. A 4-page folder tells you about the compact lightweight self-contained transmitter and receiver, Carfone Station 15, and how you can use it to save time and money. Radio Corp. of America, Camden, N. J. **(56)**

EXHAUST CONDITIONER. Ruth Co., Denver, Colo., has put together a very interesting booklet on the use of diesels for underground and how to eliminate exhaust gases. Contains much information on the problem in general. **(57)**

SAMPLING, REPRESENTATION AND RESEARCH. Ledoux and Co., Teaneck, N. J., offers an excellent booklet to introduce you to their new building in N. J. where they provide such services as analysis, sampling, representation, testing and research. **(58)**

MAINTENANCE CONTROL. This folder contains a lot of good ideas to assist you in keeping up with your plant maintenance. It also shows you the equipment that is needed to do a good job in keeping track of plant maintenance. Victor Adding Machine Co., Alliance, Ohio. **(60)**

AIR FLOW DETECTION. Application ideas, installation tips and suggested circuits for utilizing the recently-announced Detect-A-Flo unit, a versatile device that controls or detects both liquid level and air flow, are presented in a new 16-page illustrated booklet offered by Fenwal, Inc., Ashland, Mass. **(61)**

SYNCHRONOUS MOTORS. Synchronous motors, their operation and control, are described in a 16-page bulletin (GEA-5873) available from the General Electric Co., Schenectady, N. Y. **(62)**

LIFT TRUCKS. Now available is a new eight-page illustrated catalog (1284) on the Hyster YT-40 lift truck, a 4000-lb capacity model featuring trunnion-mounted steering and pneumatic tires. It is an all-purpose, inside-outside truck. Hyster Co., Portland, Ore. **(63)**

SPEED REDUCERS. This 16-page catalog (P53) fully describes the improved Philadelphia planetary speed reducer. Units are available in single, compound or double types, and horsepower ratings are A.G.M.A. Class 1. Standard ratios range from 4.3 to 1, to 106 to 1. Philadelphia Gear Works, Philadelphia, Pa. **(64)**

FIRE EXTINGUISHER. One of the most complete catalogs of products for fighting fires that we have ever seen is available from the Fyr-Fyter Co., Dayton, Ohio. Everything from ladders to sirens is covered. **(65)**

V-BELTS. An 8-page catalog on the patented "Veelos" TD and TE adjustable V-belt for D and E belted drives has been published by Manheim Mfg. & Belting Co., Manheim, Pa. Included are directions on "How to Measure, How to Couple and Uncouple, and How to Install." A table shows correct lengths for Veelos adjustable v-belts, compared with endless v-belts. **(66)**

ADJUSTABLE-PITCH FANS. Adjustable-pitch fans for cooling tower, heat exchanger and mine use are described in Bulletin A-111, of Hartzell Propeller Fan Co., Piqua, Ohio. **(67)**

AUTOMATIC CONTROLS. Reeves Pulley Co., Columbus, Ind., announces the availability of the 24-page "Automatic Production Control Booklet," bulletin G-537, which covers the complete line of Automatic Controls available on Reeves Variable Speed Drives. **(68)**

NICKEL-CADMIUM BATTERY. The much-discussed nickel-cadmium battery is the subject of 2 booklets available from Sonotone Corp., Elmsford, N. Y. The first is "Performance Data on the Sonotone Nickel-Cadmium Battery" and the second is "More Power to the Man With a Battery Problem." **(69)**

PROPORTIONING OIL BURNER. Practically all you can want to know about the proportioning oil burner made by Hauck Mfg. Co., Brooklyn, N. Y., is covered by photographs in a 24-page booklet. Includes information on push button, ignition, automatic control of combustion, temperature and flame safeguards. **(70)**

LOCOMOTIVES. A "must" for your mine locomotive file is "Bigger Payloads," a bulletin issued by Westinghouse Electric International Co., New York, N. Y. Well illustrated, it has all the information you need on the mine locomotives manufactured by this company. **(71)**

RUST PREVENTION. Just released by the Rust-Oleum Corp., Evanston, Ill., general catalog No. 253 provides an outstanding treatise on rust prevention and is dedicated to showing how to stop rust. **(72)**

USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

Not good after June 1, 1954, if mailed in the U.S. or Canada.

Engineering and Mining Journal—April, 1954
NOT GOOD AFTER JUNE 1, 1954—if mailed in U. S. or Canada

Please send me the catalogs or further information about the items from New Products Digest whose numbers are circled.

1	8	15	22	29	36	43	50	57	64	71	78	85	92
2	9	16	23	30	37	44	51	58	65	72	79	86	93
3	10	17	24	31	38	45	52	59	66	73	80	87	94
4	11	18	25	32	39	46	53	60	67	74	81	88	95
5	12	19	26	33	40	47	54	61	68	75	82	89	96
6	13	20	27	34	41	48	55	62	69	76	83	90	97
7	14	21	28	35	42	49	56	63	70	77	84	91	98

My Name ..... Position .....

Company .....

Address .....

STEAM HOSE. Every type of steam hose application is covered in a bulletin released by Quaker Rubber Corp., Philadelphia, Pa. Included are performance data, sizes, weights and working pressures plus information on the different kinds of couplings best suited for specific uses. **(73)**

TRANSFORMERS. Large distribution transformers (250-500 kva) designed to cope with increased load densities on distribution systems are discussed in booklet B-6134 from the Westinghouse Electric Corp., Pittsburgh, Pa. Constructional and standardization characteristics of Type SL are described and related to economic handling and operation procedures. **(74)**

CHEMICAL PUMPS. Roy E. Roth Co. of Rock Island, Ill., announces a line of end-mounted chemical pumps for acids, caustic solutions, solvents, and liquefied gases. The line consists of 27 models suitable for heads up to 600 ft in a single stage and capacities from 1 to 100 gpm. **(75)**

ELECTRIC VIBRATORS. Catalog 10 contains factual and technical data on the line of electric vibrators known as the Model RC Cleveland and the Model MC. They will handle any granular material—coal, sand, gravel, cinders, wood chips, in an almost noiseless operation, with extremely heavy impact for its weight. A totally enclosed housing seals the unit from moisture and dust. Cleveland Vibrator Co., Cleveland, Ohio. **(76)**

REPLACEMENT CHAINS. The 12-page bulletin 1053, lists Kenkrome replacement chains for cement, sand, gravel, crushed stone, brick and clay plants, coal mines and preparation plants and pulp and steel mills. Chains catalogued include the bar, 700 and 800 pintle, miscellaneous pintle, rivetless, bar link, detachable link, combination, drag and roller types. Kensington Steel Co., Chicago, Ill. **(77)**

HOSE CLAMPS. Punch-Lok Co., Chicago, Ill. has published a 24-page booklet entitled "Clampways Ideas", based on the results of a contest directed to the company's jobber organization for the purpose of gathering interesting case histories of the most unusual uses for Punch-Lok hose clamps. **(78)**

ELECTRIC FURNACES. For general and analytical laboratories, pilot plant, and production, a 4-page brochure (#1153) covers electric ovens—gravity and recirculating—Magni-Whirl water baths, and Lab-Heat furnaces. Units range in temperature from 100 deg to 2000 deg F. Blue M Electric Co., Chicago, Ill. **(79)**

DIESEL ENGINES. Higher output and greater savings through new improvements of the Nordberg Type TS-21 Diesel engines are discussed in bulletin 224A, recently published by Nordberg Mfg. Co., Milwaukee, Wisc. **(80)**

ELEVATOR BUCKETS. Link-Belt Co. has released a comprehensive 12-page book, No. 2465, on its complete line of cast malleable and Promal elevator buckets, including Styles A, AA, AA-RB, B, C and Continuous, for handling such diverse materials as coal, coke, ores, grain, cement, chemicals, pulp, clay, sugar, salt, etc. Fifty-five standard sizes are listed with tables give dimensions, weights and capacities. **(81)**

EXPLOSIVES. A 48-page book and catalog titled "Atlas Explosives Products" offers specific aid in selection of industrial explosives for underground and strip mining, quarrying and construction, seismic prospecting, pipe-lining. More than 80 illustrations and more than a score of tables summarize in text and pictures the methods and explosive material commonly specified for most effective economical results. It describes and tabulates properties of various types of explosives, blasting equipment and accessories. Included is a section on the Rockmaster (milli-second delay) system of blasting. A complete index includes more than 150 items. Atlas Powder Co., Wilmington, Del. **(82)**

LEVEL INDICATORS. "Telstor" Electronic Level Indicator is illustrated and described in a graphic 8-page bulletin just released. Instrument features simplified circuitry, accuracy to plus 2%, and continuous indication at remote or local stations. Robertshaw-Fulton Controls Co., Philadelphia, Pa. **(83)**

SOLUBLE SILICATES. Philadelphia Quartz Co., Philadelphia, Pa., announces the addition of two new products to its line of soluble silicates—anhydrous sodium metasilicate and sodium orthosilicate, known as Metso Anhydrous and Metso 200. Metso Anhydrous is technically pure anhydrous sodium metasilicate (Na_2Sio_3). Metso 200, highly concentrated sodium orthosilicate, is designed for cleaning operations that require extra strong alkaline activity like the cleaning of ferrous metals prior to electroplating and enameling. **(84)**

THERMOMETERS. This 44-page catalog on remote bulb thermometers covers selection data, recorders and indicators, pneumatic control, electric control, program control, psychrometers, bulbs, tubing and fittings. Minneapolis-Honeywell Regulator Co., Philadelphia, Pa. **(85)**

SEPARATOR. The 1954 SWECO Separator Catalog features a unique four-color cut-away engineering drawing of this vibrating screen device. Clearly shows suspended screen cloth and easy accessibility to parts as well as interchangeability of screens. A complete data file accompanies catalog. Southwestern Engineering Co., Los Angeles, Calif. **(86)**

CRANES, SHOVELS AND DRAGLINES. "P&H Electrics" is the title of a well conceived 16-page booklet on the cranes, shovels and draglines made by Harnischfeger Corp., Milwaukee, Wisc., in capacities up to 10 cu yd. The booklet describes the details of construction and pictures applications. **(87)**

FEEDERS AND SIZERS. Pulva Corp., Perth Amboy, N. J., offers a looseleaf catalog which covers in detail their Pulva sizers, Com-Bin Feeders and auxiliary equipment. **(88)**

SAFETY SHOES. A 6-page folder from Bone-Dry Shoe Mfg. Co., Tacoma, Wash., tells you all about the safety shoes that they manufacture for all kinds of industry. **(89)**

FIRST CLASS
PERMIT NO. 64
(Sec. 34.9, P.L.&R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed In The United States

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ENGINEERING & MINING JOURNAL
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to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, on reverse side, tear out and mail.

Even the Ancient Chinese had a Yen for Parking Meters

Time wasn't very valuable in ancient China but hot water was, because fuel had been scarce ever since anybody could remember. So, when a fastidious citizen parked himself in the community tub and called for the Saturday Night Special, one of the boys clocked off the hours on the very quiet-running timepiece above. This simple clock consisted of four copper tubs with water dripping slowly from one tub to the next. In the bottom one, a float, rising with the water, indicated the time—and hot water consumption—on a scale. It wasn't very accurate but five hundred years ago it was considered a marvel of ingenuity. It's much easier to keep accurate tab on operating costs today, and in the drilling business, those costs are always appreciably lower when Truco Diamond Bits are on the job. Their irresistible cutting power takes them through any formation, swiftly, accurately, thriftily, dependably. They are used profitably in every phase of drilling. May we send you our catalog?

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue **Detroit 6, Michigan**

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue Windsor, Ont., Canada

Here's why Allis-Chalmers Motor Scrapers give you

EXTRA YARDAGE ON EVERY SHIFT

Modern equipment helps cut your operating costs in today's competition. Let your Allis-Chalmers dealer demonstrate how the Motor Scraper actually saves time on every trip, gives you extra yardage every shift.

	Hp.	Struck Cap. Yd.	Heaped Cap. Yd.	Wt. Lb.
TS-300	280	14	18	47,900
TS-200	176	10	13	37,600

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Check these YARDS AHEAD features:

• Spend less time loading, get big loads . . .

Allis-Chalmers Motor Scrapers have up to 20 horsepower for every yard of struck capacity — for fast loading. A curved bottom and offset cutting edge boils the dirt in *fast* . . . completely fills the bowl and packs yardage-robbing corner voids.

• Spend less time traveling . . .

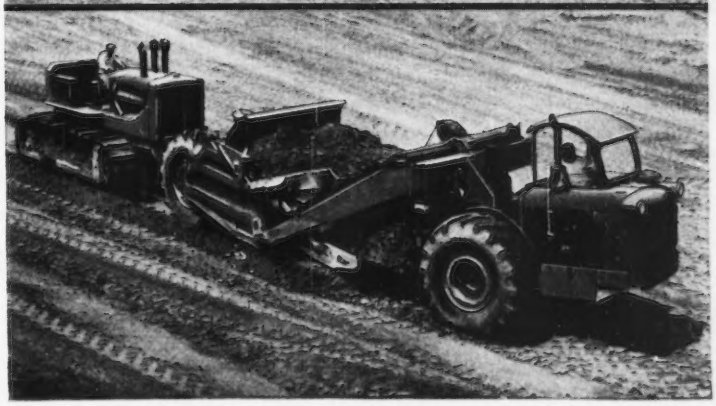
The equal division of weight between front and rear wheels, low center of gravity, high-traction tires plus four-wheel air brakes give the operator confidence to run at top speeds. Foam rubber seat, finger-tip control, shock-free hydraulic steering and full visibility add safety and operator comfort, which pay off in greater output.

• Spend less time dumping . . .

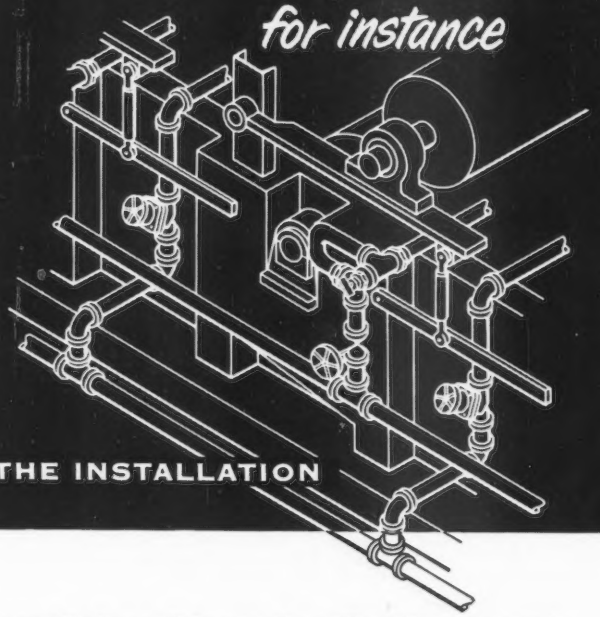
Positive, forced ejection "bulldozes" dirt out on the run, spots or spreads it right where you want it. Ejector rides on a three-point roller suspension . . . assures complete dumping of sticky loads. High apron opens to a big 8 ft. 6 in.

• A dirt-moving package that makes every second count . . .

The powerful HD-20 hydraulic torque converter tractor is an ideal team mate for your Motor Scraper. It automatically balances its speed to that of the scraper, makes full use of tractor horsepower at all times, avoids strain on the operator and equipment . . . gives scraper an extra fast start to the fill.



Doing What Other Valves Couldn't ...on Slurry Service, for instance



THE INSTALLATION

Crane Diaphragm Valves on slurry-like white water service to cylinder tanks on paper-making machines at Excello Paper Products Co., Inc., Cincinnati.

VALVE SERVICE RATINGS

SUITABILITY:	"Made to Order" for tough jobs
FEATURES:	Seats tight where others fail
MAINTENANCE COST:	None - needs no attention
SERVICE LIFE:	Many times longer than expected
OPERATING RESULT:	Plant efficiency improved
AVAILABILITY:	Crane Catalog item - No. 1610

THE CASE HISTORY

Valves formerly used had been giving much trouble that started between tank fillings. While many replacements were tried, none of the valves could handle the white water solids and fibers that built up in the bonnet and seats between operations. Result was the valves were hard to operate, and leaked at the seats.

Keeping up with valve maintenance and the hazardous, messy floors caused by white water leakage was costly and annoying. But it was a problem that Crane Diaphragm Valves solved handily. The leakage stopped—machine room efficiency went up as the safety hazard was gone—plant appearance improved. Installed about a year ago, Crane Diaphragm Valves keep doing these things without a penny's maintenance cost to date.

THE VALVE

Crane Diaphragm Valves are packless. Bonnet and working parts are sealed to line fluid; there's no place for sediment to build up. Independent disc and diaphragm design saves wear on diaphragm, permits valve to be closed even should diaphragm fail. Pliable disc insert seats tight on foreign particles that cause leakage and wire drawing in ordinary valves. Choose these valves from wide variety of body and trim materials for corrosive, abrasive, and ordinary services. See your Crane Catalog or Crane Representative.

THE BETTER QUALITY... BIGGER VALUE LINE... IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

How INDIVIDUAL DESIGN Speeds Up Ore Loading

Watch a Bucyrus-Erie at work and you'll see that it loads fully and quickly, swings smoothly under sure control of the operator, dumps its load accurately — delivers the fast smooth cycle that means big output.

Behind this precision blending of operating functions is the Bucyrus-Erie *individual design* that gives each machine the right balance of speed, power, strength, and weight to handle its big loads most effectively. Every Bucyrus-Erie has the built-in individuality that makes it *just right* for its job range. That's why Bucyrus-Eries are so consistently ahead in output on ore loading operations.

If your pit needs call for shovels or draglines with gasoline, diesel or single-motor electric power in the 3/8- to 4-cubic yard size range, see your Bucyrus-Erie distributor for complete details on how you can step up output with a Bucyrus-Erie — the line that features Individual Design for each model.

43E53

BUCYRUS-ERIE COMPANY ♦ South Milwaukee, Wisconsin

Maximum Footage - Maximum Economy

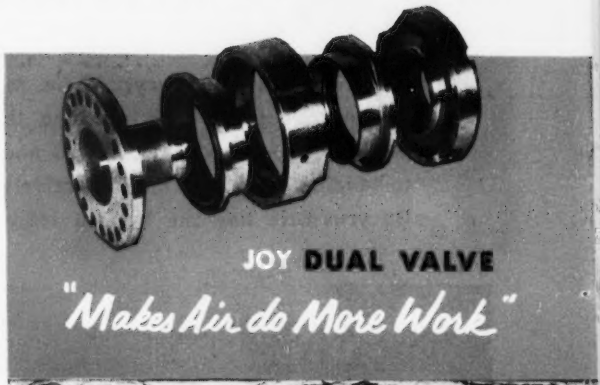
with JOY DUAL-VALVE SILVER STREAK DRILLS

In tunnels, crosscuts, drifts, or stopes, Joy *Silver Streak* Rock Drills with the DUAL VALVE will do your drilling job faster, and use less air with lower maintenance. Here's why—

(1) The exclusive DUAL VALVE, a feature of all Joy rock drills, makes air do more work. By admitting the correct amount of air behind the piston and excluding air ahead of it during the drilling stroke, maximum force is exerted on the drill steel. There's no cushion of air ahead of the piston to reduce the force of the blow. Then the rear section of the Dual Valve meters the correct amount of air ahead of the piston to force it back with a "snappy" rotating action. This adds up to more power-packed strokes per minute, for faster drilling with less air.

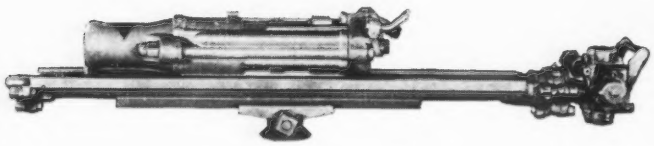
(2) The silver-like cadmium plating on Joy *Silver Streak* Rock Drills aids lubrication while running-in, protects parts from rust while in stock, and keeps maintenance costs at a minimum.

The Joy line is complete. There's a *Silver Streak* rock drill for every rock breaking need. Types included are drifters, stopers, hand-held drills, Hydro Drill Jibs. To complete the line, there are wagon drills; the QB-20 for line drilling and dimension stone quarries; rubber-tired, self-propelled Drillmobiles; and specially mounted drills for special needs. Let our Field Men work with you. • *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada, *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



JOY DUAL VALVE

"Makes Air do More Work"



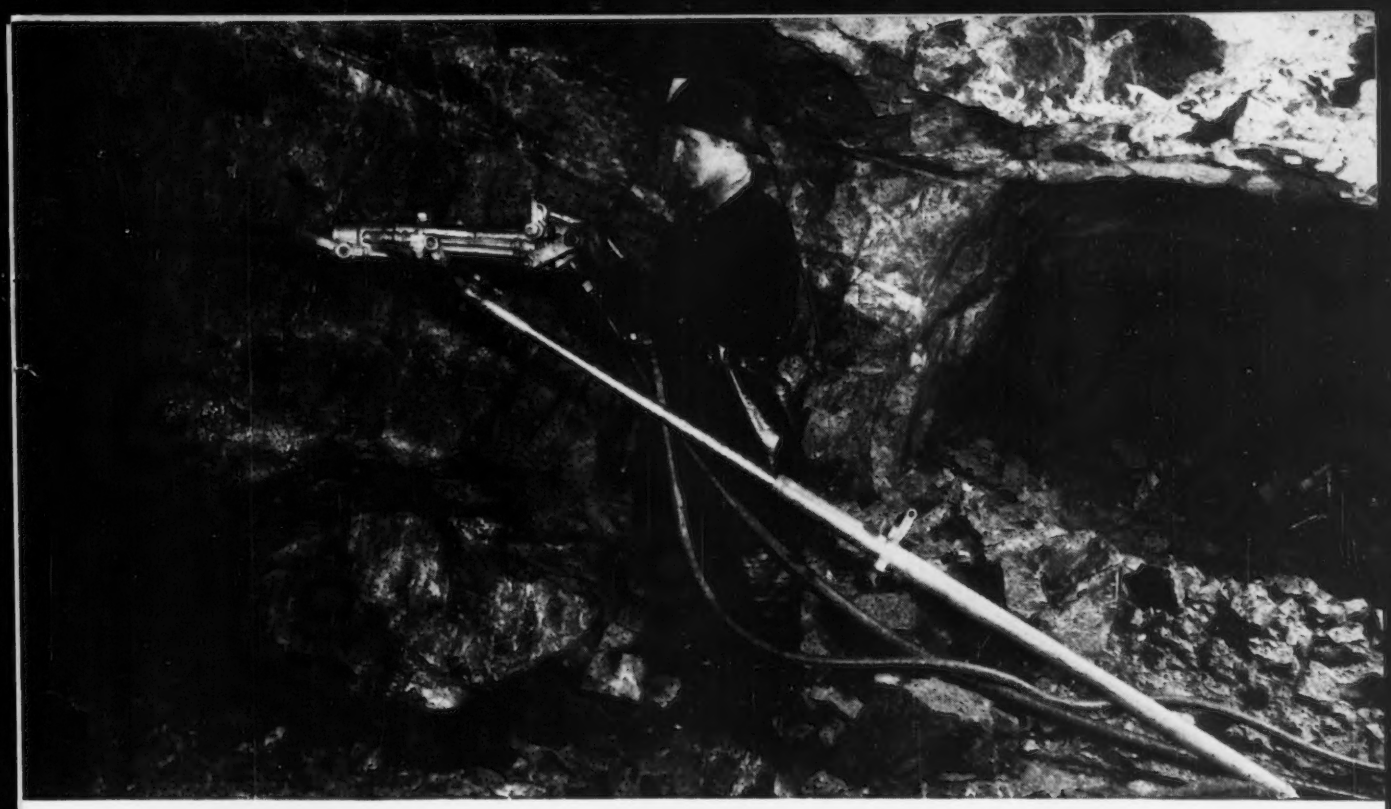
JOY **DRIFTERS**

For use on mobile jumbo units, as at right, or for column mounting, Joy Drifters are built in three sizes—all with fast, powerful Dual Valve action. Efficient Pistonmotor Feed, with only two moving parts, provides strong, steady, advancement and retraction. One-piece locking chuck increases bearing area and reduces wear on lock ring and chuck bushing.

JOY TELESCOPIC FEED STOPERS

The S-91T (right) provides a steel change of 36", compared with the 18" change of conventional stopers. In most mining conditions, this long feed gives more drilling time, fewer steel changes and fewer lengths to stock.

W&D 37



LOOK . . . ALL THE BEST FEATURES

BUILT-IN FEED CONTROL *in backhead gives an infinitely variable range without step-by-step graduation.*

PUSH-BUTTON PRESSURE RELEASE *on control handle for quick retraction. Reduces pressure without re-setting feed control when drilling soft seams.*

BALANCED FORWARD PRESSURE *by attaching Air Leg at horizontal center line of drill. Minimizes misalignment of drill and steel, gives longer chuck life.*

LIGHTWEIGHT *and easily assembled, dismantled and moved around the mine.*

"WE OUTDRILL EVERYTHING WITH OUR JOY AIR LEG AND LM-47 DRILL . . ."

". . . Because the Controls Are On The Handle
We Can Beat Any Leg In the Mine—"

. . . SO REPORTS AN ENTHUSED MINER when asked about his Joy Air Leg used with the powerful Joy LM-47 Drill.

"IN LOOSE, BROKEN, OR FITCHERY GROUND you just can't top the Joy setup."

"FOR DRILLING LIFTERS" he continues, "we like the way the yoke fits into the machine. With no controls on the leg it's easy to drill off a drift round."

Try a Joy Air Leg and LM-47 Drill. You'll agree they are a perfectly matched pair and present something new in easy, efficient drilling and handling.

Write *TODAY* for details. • **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

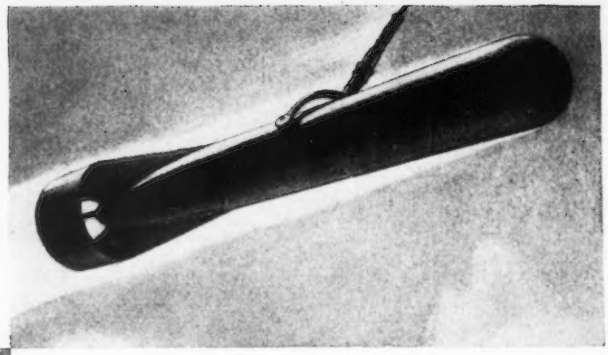
W&D 4944

Consult a Joy Engineer

JOY

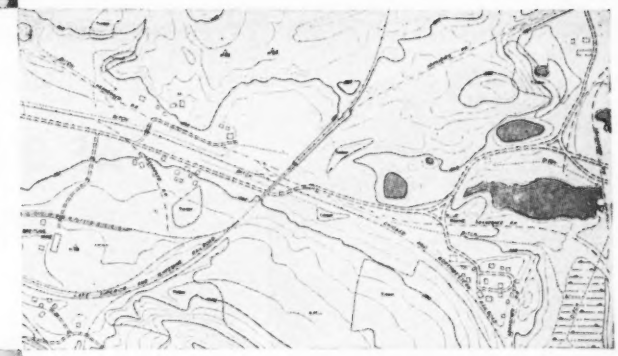
WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

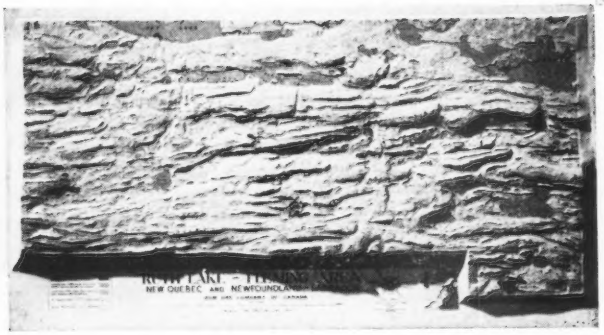
Important mineral finds are being uncovered by Aero clients with the airborne magnetometer



Precise aerial mosiacs provide valuable reconnaissance and planning data

Accurate Aero topographic maps aid engineering development





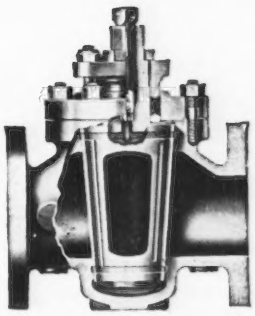
Light weight, plastic relief models give Aero maps a 3rd dimension for management

AERO's modern mining tools are cutting exploration and mapping costs . . . helping to locate new deposits of magnetite, ilmenite, nickel and asbestos . . . and putting schedules months and even years ahead. AERO maps are delivered speedily, and are so accurate, mining engineers are using them for plotting boreholes, property lines, rail spurs, access roads, power lines, and other phases of planning and development. Call on 35 years' experience of AERO—pioneer and leader in aerial surveys.

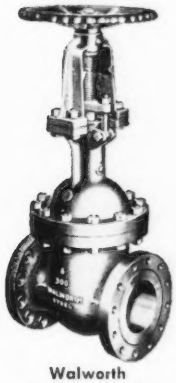
AERO SERVICE CORPORATION
PHILADELPHIA 20, PA.
Oldest Flying Corporation in the World

● VALVES

● PIPE FITTINGS



Walworth
Lubricated Plug Valve



Walworth
Steel Gate Valve

Walworth
Iron Body Gate Valve

Walworth
"500 Brinell" Bronze Globe Valve

Walworth
Iron Body Saddle Gate Valve

Walworth
Cast Steel Flanged Fittings

Walworth manufactures a *complete line* of valves and pipe fittings: all made to the highest standards of quality, both as to dimensional accuracy and metallurgical properties. In design, construction, and performance, Walworth products reflect more than a century of experience in the manufacture of quality valves and fittings.

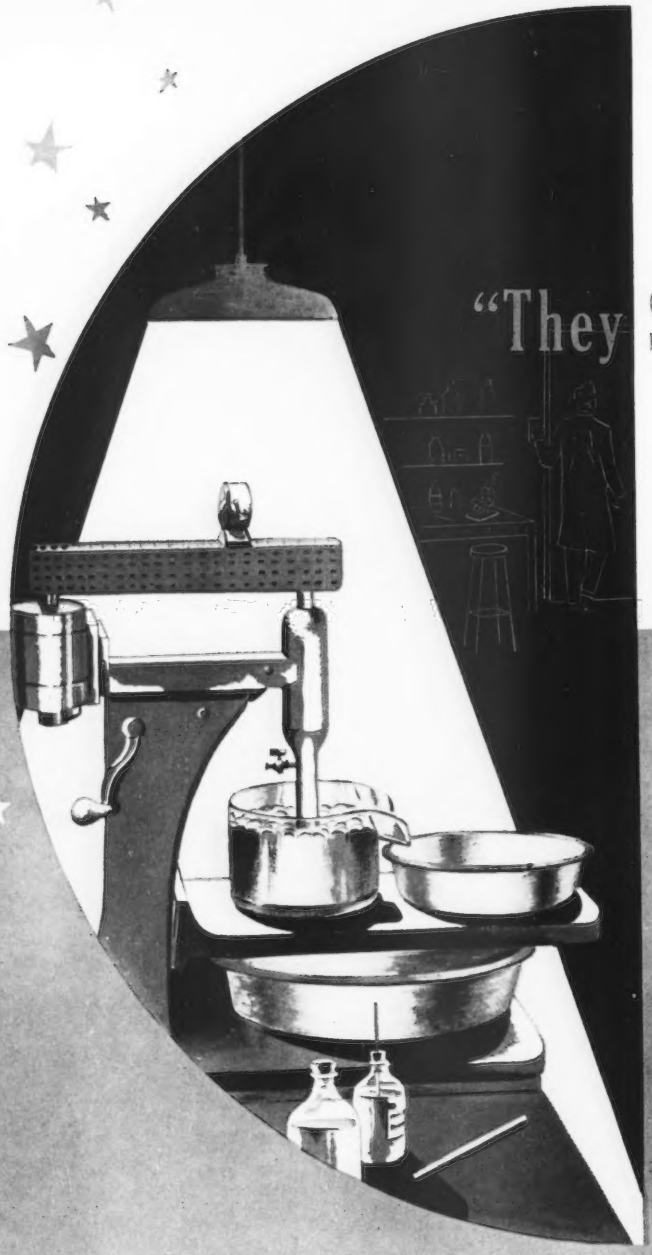
Your Walworth distributor will give you full information on the *complete line* of Walworth steel, iron, and bronze, and special alloy valves and pipe fittings; also Walworth Lubricated Plug Valves, and Walseal* valves, fittings and flanges. Ask for this information today.

*Patented—Reg. U. S. Pat. Off.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.



"They Slept on the Problem"

and learned how to produce low-iron glass sand with Cyanamid 800 Series Promoters

Hours of testing had come to naught. Flotation with 800 Series Cyanamid Promoters would *produce low-iron glass sand at Del Monte Properties but 65% recovery was far too low. Puzzled and tired, the Pilot Plant Superintendent and the Cyanamid Field Engineer decided "to sleep on the problem". But, on a hunch, they left a batch of sand to scrub at 50% solids in a lab flotation machine.*

Next day, instead of white sand, they found a black pulp . . . and the key to a workable process. Prolonged attrition had removed an iron-bearing clay. Flotation of the scrubbed sand now yielded 95% recovery of an 0.055% Fe_2O_3 glass sand!

Del Monte Properties at Pebble Beach, California is an excellent example of the use of chemical flotation to convert beach and dune sand into four valuable, custom-built products.

Raw sands, comprising equal parts of quartz and high-alumina minerals, average 0.12 to 0.15% Fe_2O_3 and 11.5% Al_2O_3. Scrubbed in specially designed attrition machines, these sands are then de-slimed, conditioned and the iron-bearing minerals floated, leaving behind 95% of the feed in a finished product that assays 0.06% Fe_2O_3 and 10.76% Al_2O_3.

Flotation reagents per ton include: 0.45 lb. sulfuric acid, 0.40 lb. fuel oil, 0.01 lb. pine oil, 0.55 lb. AERO* Promoter 801 and 0.45 lb. AERO Promoter 825.

Subsequent flotation in another section produces a high-grade feldspar concentrate and a practically-pure (99.07% SiO_2) quartz tail-

*Trade-Mark

ing. Feed to this section can be split to control the quantity of iron tailings floated, thereby controlling alumina in the end product. Del Monte Special "77" Sand, for instance, containing only 6.50% Al_2O_3 and 0.051% Fe_2O_3 commands an active, premium market.

Cyanamid 800 Series Promoters are now being used to beneficiate glass sands, feldspar, garnet, barite, kyanite, rhodochrosite and similar non-metallic minerals. Cyanamid also offers Heavy-Media Separation and Dutch State Mines Cyclone Separator Processes, both of which merit investigation for non-metallic mineral concentration by gravity difference.

With the practical help of a Cyanamid Field Engineer experienced in up-grading low value non-metallics, you may be able to cut costs by less-selective mining, work currently sub-marginal deposits or ship higher-grade end products. Preliminary discussion entails no cost or obligation. Why not write, outlining your problem?

It will pay you to talk with a Cyanamid Field Engineer if you mine or contemplate mining:

Andalusite · Barite · Bauxite · Cement Rock · Coal · Chromite Diamondiferous Ground · Dolomite · Feldspar · Fluorspar Garnet · Glass Sands · Graphite · Gravel · Gypsum · Ilmenite · Iron Oxides · Kyanite · Magnesite · Manganese · Mica · Olivine Perlite · Phosphate Rock · Potash · Rhodochrosite · Sillimanite Salt · Scheelite · Spodumene · Vermiculite · Wolframite

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK

Double YOUR FOOTAGE

in the softer rock formations

The new CP-555's short over-all length permits set-up in restricted quarters.

Now, for the first time, you can have a fast and powerful rotary drill with an entirely independent rotary motor feed that affords full control at all times. And it's all combined in one compact machine – the new CP-555 Rotauger. Available for dry or wet drilling, it drills 2½ inch holes in speeds of 2 to 4 feet per minute in depths to 100 feet or more in gypsum, talc, medium limestones and other softer formations. For more information write for Bulletin SP-3110.

Chicago Pneumatic Tool Company, 8 East 44th St., New York 17, N. Y.

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

"Save money?

Sure!"

THAT, in a nutshell, tells you why so many wire rope users in the mines prefer Roebling wire rope... it speeds up operations... lasts longer on the job ...saves money that really adds up.

For the last word in wire rope efficiency and economy, call your nearest Roebling office or distributor for a Roebling recommendation.

ROEBLING CF&I

A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

This S-A 1412-foot conveyor at Chuquicamata's oxide plant has moved nearly 200,000,000 tons of crushed ore since 1926 without major replacements or repairs. The unique "tip-back" feature of these S-A "444" Carriers allows them to be inspected without shutting down the belt.

NEW CHUQUICAMATA SULFIDE PLANT

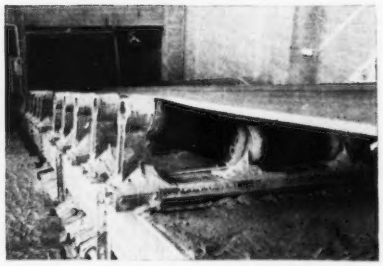
Handles 30,000 Tons of Ore A Day on S-A Belt Conveyors

The Chile Exploration Company's Chuquicamata plant has been called one of the largest and best engineered mining jobs in the world. An outstanding feature is the materials handling system.

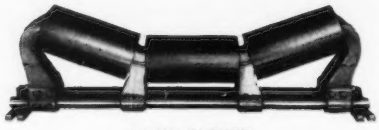
In planning this system, the company had the record of its older oxide plant to go by. Here more than 2500 S-A "444" heavy duty carriers have been in service for *over a quarter of a century.* All of the original S-A "444" carriers are in the multi-million ton class and are still on the job.

Because of this impressive performance, S-A "444" Carriers were specified for the miles of belt conveyors installed at the new Chuquicamata sulfide plant. While relatively expensive to begin with, their ability to take punishment year after year means lower handling cost per ton.

The same kind of performance that dictated Chuquicamata's choice of S-A Carriers is your assurance of lower costs, least maintenance and unfailing service when your belts travel on S-A Carriers. Write to have an S-A engineer call upon you —or send for our Carrier Bulletin No. 2-C.



These "Mammouth" carriers are probably the largest anti-friction units ever built. Equipped with double roller bearings they are designed to meet extremely rugged operating conditions.



"444" CARRIER

STEPHENS-ADAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Ill. • Los Angeles, Calif. • Belleville, Ontario

Engineering Division
Specialists in the design and manufacture of all types of bulk materials conveying systems.

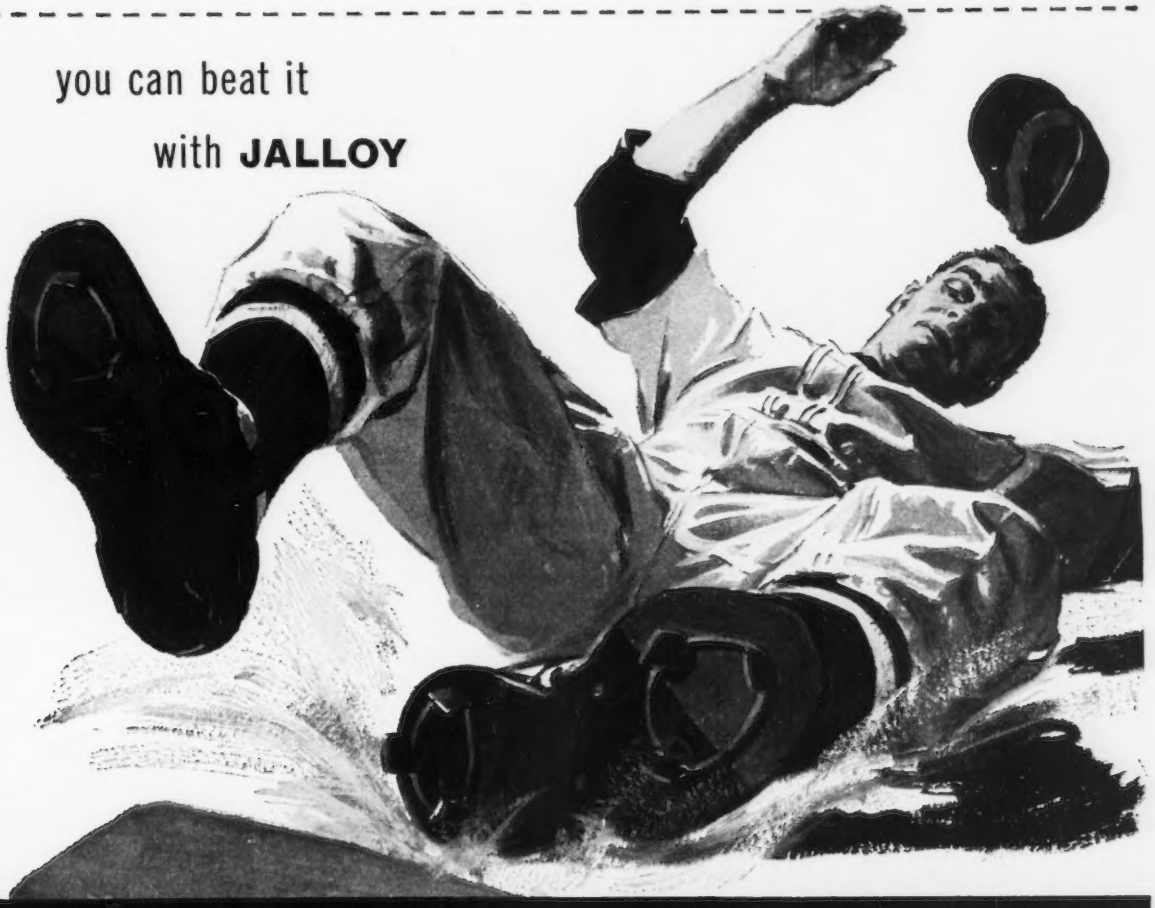
Standard Products Division
A complete line of conveyor accessories including centrifugal loaders—car pullers—bin level controls—etc.

SealMaster Division
A complete line of industrial ball bearing units available in both standard and special housings.

FACING A TOUGH PROPOSITION?

you can beat it

with **JALLOY**



J&L JALLOY HEAT-TREATED PLATE BEATS WEAR DUE TO ABRASION

J&L Jalloy Heat-Treated Plate is the general purpose steel that is heat treated to provide longer wear on applications where impact and abrasive conditions are severe.

In comparison with other abrasion-resistant steels as well as mild steels, it gives optimum results when heat treated to a Brinell hardness of 340 and up. Jalloy permits savings in steel costs, maintenance, and repair. Furthermore, it is easily welded. Jalloy is available in three grades to meet various service requirements.

J&L STEEL

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

Complete data concerning CHEMICAL COMPOSITION . . . HEAT TREATMENT . . . WELDABILITY . . . PHYSICAL PROPERTIES . . . will be mailed to you promptly. Write today.

Jones & Laughlin Steel Corporation
3 Gateway Center, Dept. 412, Pittsburgh 30, Pa.

☐ Please mail complete data concerning Jalloy.
☐ Please have your representative call.

Name_____ Title_____

Company_____

Address_____

_____

ENGINEERING SIDELIGHTS OF THE EMPIRE STATE BUILDING:

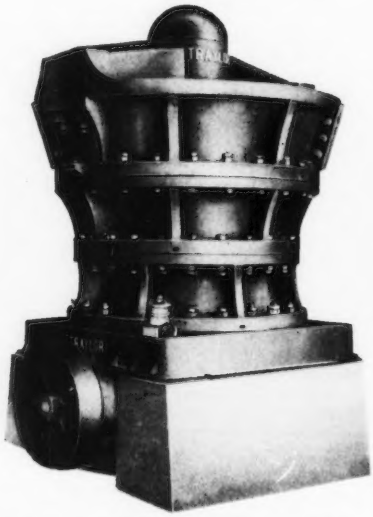
Construction of the world's tallest building in 1931 was so well coordinated that builders erected 10,000 tons of steel per month in the heart of busy Manhattan without blocking traffic in the City's streets. After the first six floors, workers raised steel at the rate of one floor per day until completion of this 1,250-foot, 102-story skyscraper. Perfect planning and smooth teamwork made this a truly outstanding example of modern engineering achievement.

Modern Construction Demands Improved Materials

For over half-a-century Traylor Engineers have worked closely with industry in creating equipment that's "TRAYLOR-MADE" to produce better materials . . . materials that continue to keep pace with increasingly exacting demands of advanced engineering practices. The Traylor TC Gyratory Crusher is a *modern* example of this coordinated teamwork. You'll find sound engineering proof of this in Traylor Original Curved Concaves and Bell Heads. These Curved surfaces apply power efficiently as a direct crushing force to reduce lifting and churning of material in the crusher. Choking and packing are practically eliminated because each zone in the crushing chamber has greater capacity than the preceding zone . . . reduced material has free fall from the discharge end. These achievements of Traylor Engineering assure a more uniform product to meet the constant demand for better materials. Traylor bulletin 126 gives complete specifications for all Traylor Gyratory Crushers. Send for your free copy today.

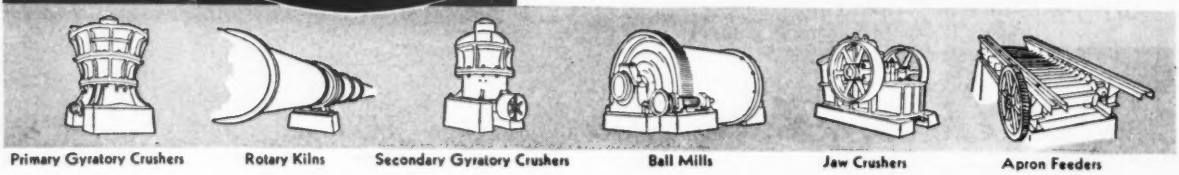
Traylor's Big 60" TC Gyratory has the Capacity to reduce 303,000 tons of material (weight of the entire Empire State Building) in less than 106 hours.

Traylor TC Gyratory Crushers are built in seven sizes with feed openings from 20" x 80" to 60" x 210".



TRAYLOR ENGINEERING & MANUFACTURING CO.
632 MILL ST., ALLENTOWN, PA.

SALES OFFICES: New York • Chicago • San Francisco
CANADIAN MFRS: Canadian Vickers, Ltd., Montreal, P. Q.

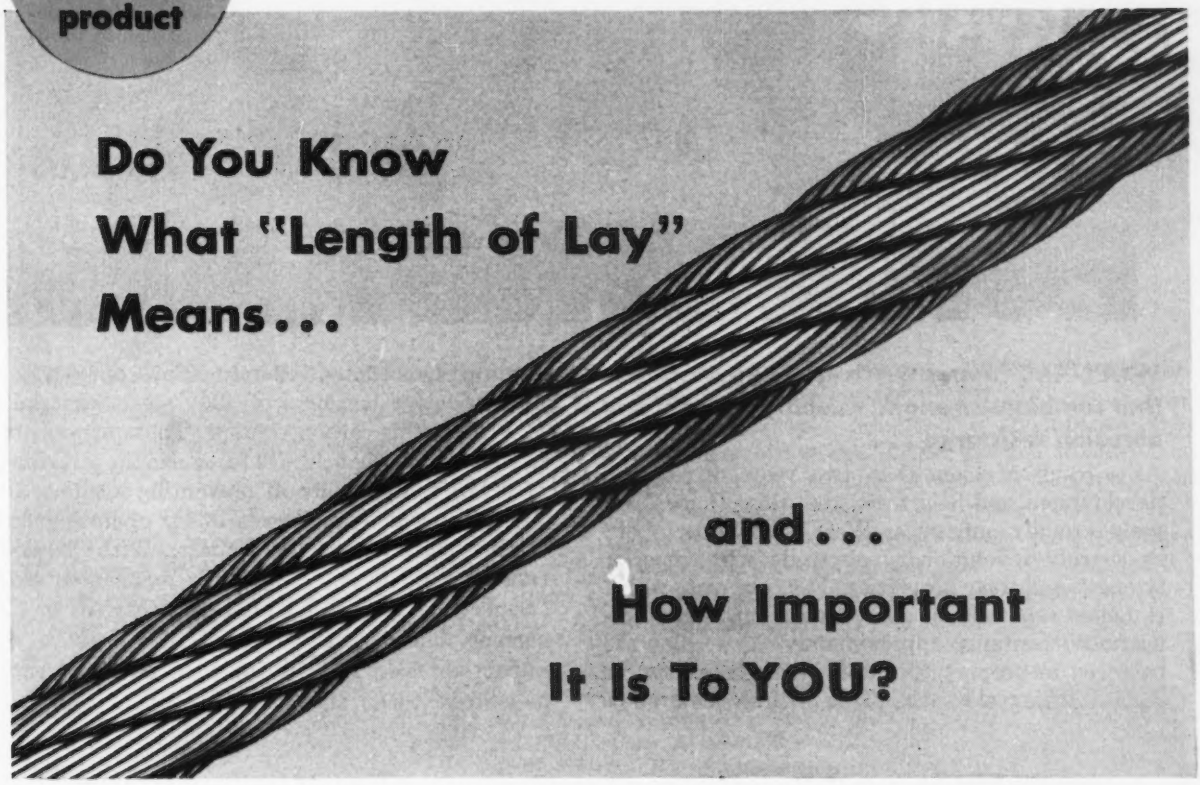


Primary Gyratory Crushers | Rotary Kilns | Secondary Gyratory Crushers | Ball Mills | Jaw Crushers | Apron Feeders

an ACCO product

AMERICAN CABLE

"GREEN STRAND" WIRE ROPE



Length of lay is the distance allowed for a strand to make one complete turn around the wire rope. This distance varies depending upon the construction and diameter of the rope, and upon the service requirements. The service factors which must be considered are elasticity, flexibility, stability, resistance to abrasion, and strength.

Elasticity is desired in order that a wire rope may absorb the application of loads gradually and not with sudden shock. The shorter the lay, the more elasticity in the rope. The reverse is also true.

Flexibility is that quality which a rope possesses which permits it to be flexed or bent around sheaves and drums. This property is desired from a standpoint of fatigue resistance of wires in a rope when subjected to bending stresses. An increase in length of rope lay tends to make the rope less flexible. This does not necessarily mean that a rope with a longer lay would also have less resistance to bending fatigue with which the term flexibility is often confused.

Stability of construction can be described best by observing the result of twisting the ends of a towel in opposite directions. You will find that the structure becomes harder with the increase in the amount of twisting. It will resist distortion when outside compressive force is applied. The same is true in a strand or in a finished rope. In effect, the shorter the lay the more it will resist crushing.

Abrasion resistance would seem to require more and larger crown wires per foot exposed to wear. Shortening the lay exposes more crown wires and makes the rope more flexible so larger diameter wires can be used. Then it becomes a matter for our engineers to set the length of lay to provide abrasion resistance but not at the expense of the other factors.

Strength of a wire rope is definitely influenced by the length of its rope lay. Of two ropes, identical except for their rope lay, the one with the longer lay will be stronger. Although the shortening of lays tends towards certain desirable conditions, a critical point is always reached beyond which the lay cannot be shortened without making the rope stiff.

If all this sounds mighty complicated, forget it. We don't expect you to become a wire rope engineer. That's our job—to engineer and make the best possible wire rope for you. In our "Wire Rope Recommendations for General Contractors" you will find the correct constructions of TRU-LAY Preformed "Green Strand" for your equipment. See your American Cable distributor or write us for a copy of **No. 128-B.**

ACCO TRADE MARK

American Cable Division
AMERICAN CHAIN & CABLE

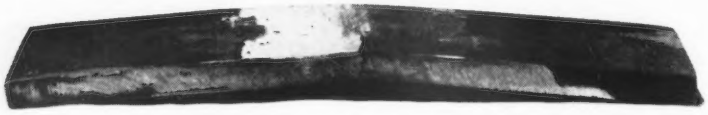
Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

plus ACCO Registered Wire Rope Slings

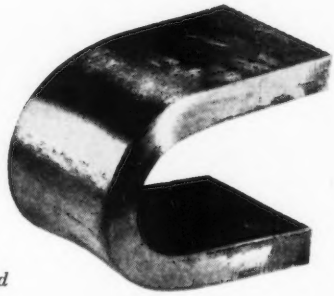
WEAR-ARC "SUPER WH" FOR MANGANESE

WEAR-ARC "Super WH"—the new electrode that combines strength, ductility, impact and abrasion resistance . . .

As a result of more than two years of research development and field tests, the Alloy Rods Company proudly announces Wear-Arc "Super WH" as a truly revolutionary electrode with superior strength and wear properties. The core wire, which is melted especially to Alloy Rods Company specifications, contains approximately 33% alloy . . . balanced in proportions never before conceived in a hard facing electrode. This entirely new alloy has a carbon content of only 0.35% but develops an equivalent hardness of alloy steels containing *three times* this carbon content. Those experienced in the hard facing field will recognize the advantage of a low carbon alloy in preventing spalling and flaking of the weld deposit under operating conditions requiring severe impact. With abrasion resistance *up to four times* over manganese steel, "Super WH", which operates on either AC or DC current, offers a new concept of values in the impact-abrasion hard facing field that will serve as a standard for the future.



(Above) Manganese steel plate welded with 14% manganese electrodes—maximum bend obtainable in free bend test.



(Right) Manganese steel plate welded with WEAR-ARC "Super WH" electrodes—after free bend test.

VISIT US AT BOOTHS 165-169

WELDING SHOW

MEMORIAL AUD. BUFFALO—MAY 5-7

WEAR-ARC "Super WH"—the new electrode that has better physical properties than any other electrode for welding manganese steel . . .

The table shows the amazing physical properties of "Super WH" as compared to heat treated manganese steel plate and the best manganese steel electrode that was available before the development of WEAR-ARC "Super WH".

	Weld Metal "SUPER WH"	Weld Metal 14% Mang.	Plate 14% Mang.
Condition of Material Tested	As welded	As welded	Heat treated
Tensile Strength (psi)	130,000-140,000	85,000-90,000	86,000-136,000
Yield Strength (psi)	85,000-90,000	45,000-55,000	45,000-55,000
% Elongation (Free Bend)	40.0%-45.0%	8.0%-15.0%	35.0%-45.0%
Carbon Content	0.35%	0.80%	1.08%
Wear Resistance Factor*	(work hardened) 2.20 to 4.10	(work hardened) 0.86 to 0.93	(work hardened) 1.00
Rockwell C Hardness (Average)			
As Welded	23.5	19.0	16.5
Work Hardened	48.5	47.0	48.0

*Ability to resist wear as compared to work hardened manganese plate. Higher figures represent greater resistance to wear.

REVOLUTIONARY *new* ELECTRODE

STEEL WELDING

WEAR-ARC "Super WH"—the new electrode that is two electrodes in one for maximum weld strength and maximum wear resistance . . .

Now only one type of electrode is necessary for attachment welding and hard facing. "Super WH" eliminates the necessity of using stainless steel or other types of electrodes for strength welds and manganese steel electrodes for wear resistance. "Super WH" will join manganese to itself or to any other type of steel with greater strength and rigidity than stainless steel and at the same time outwear the weld deposit of any manganese steel electrode *four to one*. Under normal welding conditions, it is impossible to obtain cracks in the root or subsequent passes when using "Super WH". Those who have attempted to use manganese steel electrodes for welding root passes will welcome this great electrode which also outwears any work hardening electrode ever developed.

(Left) A repointer bar has been welded in place on a worn tooth and then the entire area has been resurfaced—"Super WH" electrodes were used for both operations.

(Right) These teeth were subject to the same number of hours of service in handling approximately 12,000 tons of large rock. The worn tooth on the left was welded with 14% manganese electrodes, the one on the right was welded with "Super WH" electrodes.

SPECIAL INTRODUCTORY OFFER... **Now prove the cost-saving advantages of new WEAR-ARC "Super WH"—and do it for just $5.90!**

At this sensational low price we'll send you ten pounds of "Super WH" electrodes (in any one of the three diameters) packed in a hermetically sealed metal container—and that $5.90 includes shipping charges anywhere in the United States. *But act fast*—fill in coupon below and enclose check or money order *today* . . . special introductory offer ends May 15, 1954.

See your Alloy Rods distributor for larger quantities of the new and superior Wear-Arc "Super WH".

Alloy Rods Co.

General Offices and Plant • York, Pennsylvania
Pacific Coast Sales Offices & Plant • El Segundo, Calif.

ARCALOY Stainless Steel Electrodes • BRONZE-ARC Phosphor Bronze Electrodes • NICKEL-ARC Electrodes for Cast Iron • TOOL-ARC Electrodes for Tools and Dies • WEAR-ARC Hard-Facing Electrodes WELD-ARC Low Hydrogen Electrodes

no finer electrodes made... anywhere

Yes, I want to take advantage of your special introductory offer. I enclose $5.90 for a ten pound container of Wear-Arc "Super WH" in the following diameter: ☐ 5/32", ☐ 3/16", ☐ 1/4".

Name.....

Company Name.....

Address.....

City.....State.....

added reason to—

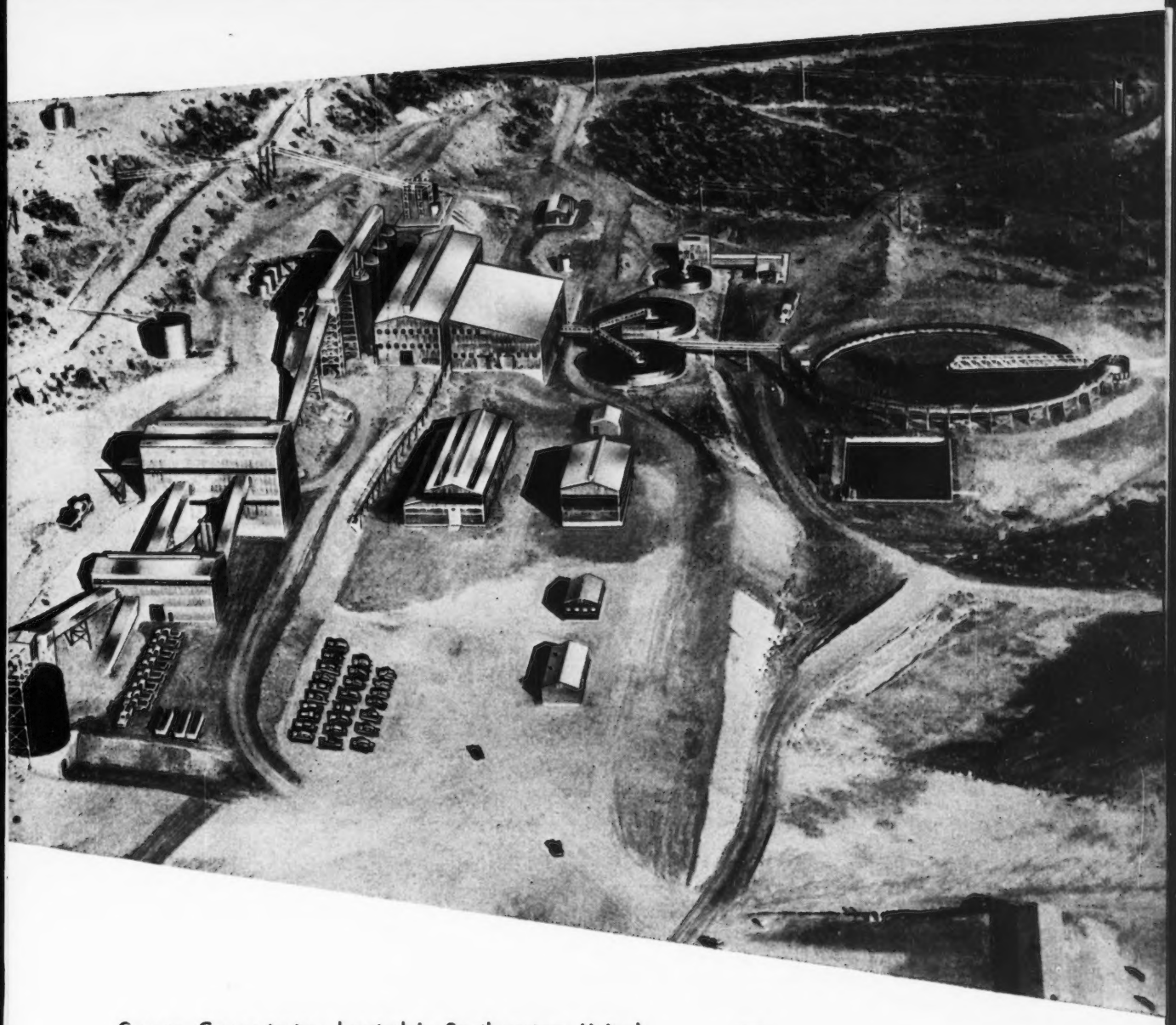
Take it up with Stearns-Roger

Moving into its new Home Office building, designed and constructed by Stearns-Roger to its own requirements, this Company improves substantially its ability to serve a fast-developing America.

In this one L-shaped building (with 90,000 square feet of floor space and capable of future expansion) every modern facility is provided for more than 500 executives, engineers, draftsmen, and office personnel.

Stearns-Roger construction crews are continuously at work on a long list of projects located in many states, the value of which totals many millions of dollars. From its Denver shops, special equipment totalling many trainloads rolls out annually to virtually every state in the Union and to many foreign countries.

For nearly three quarters of a century... the power, mining, metallurgical, chemical, sugar, and gas & oil industries have learned that it pays to "TAKE IT UP WITH STEARNS-ROGER"... whether the requirement is a complete new plant, or enlargement or modernization of existing plants.



Copper Concentrator, located in Southwestern United States, handling 7,500 tons of ore per 24 hours. Stearns-Roger made use of modern methods and equipment to achieve fully automatic operation at every possible point, with a resulting reduction in man power.

ENGINEERS

DESIGNERS

MANUFACTURERS

CONSTRUCTORS

Stearns-Roger

THE STEARNS · ROGER MFG. CO. DENVER, COLORADO

DENVER • HOUSTON

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SLASH BRAKE LINING WEAR WITH

Allison Torqmatic Brake

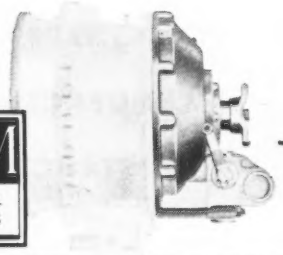
FIELD TESTS prove regular service brake linings last up to 8 times as long in trucks equipped with Allison TORQMATIC BRAKES. But increased brake lining life is only part of the story. The new TORQMATIC BRAKE also enables safer downhill hauling for heavy-duty trucks — speeds job-cycle time — boosts production — cuts maintenance costs.

On downhill hauls, the TORQMATIC BRAKE saves the regular friction brakes for complete stops or "snubbing" on curves. There are no wearing parts to burn up or wear out. Oil does all the braking work. The TORQMATIC BRAKE is installed as an integral part of the drive line in trucks equipped with Allison TORQMATIC DRIVES—uses the same oil as in the TORQMATIC Converter so there are no freezing problems in winter.

Proved in field tests

A Western contractor hauling 34-ton loads down 7% grades reports the TORQMATIC BRAKE helped increase daily round trips 50%—let him safely *triple* downhill hauling speeds — extended brake lining life 8 times.

If you're hauling on hilly, mountainous downhill runs, you can cut costs and increase production with Allison's TORQMATIC BRAKE. For full details, fill in the coupon and mail it today.



GM GENERAL MOTORS

Allison

TORQMATIC BRAKE

Newest Member of the Torqmatic Drive Line

ALLISON DIVISION OF GENERAL MOTORS
Box 894M, Indianapolis 6, Indiana

Please send me Bulletin SA 1026 with full details on the new Allison TORQMATIC BRAKE.

NAME _____

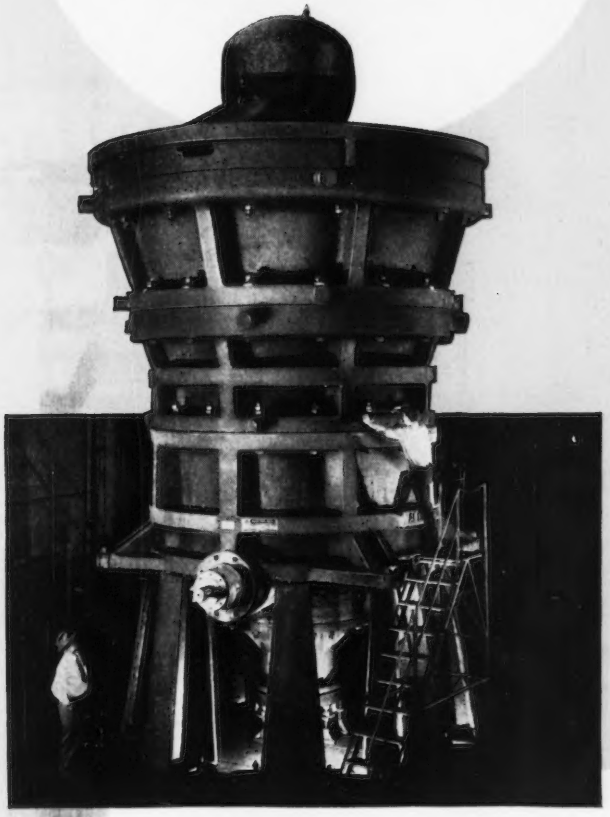
POSITION _____

COMPANY _____

ADDRESS _____

SUPERIOR Gyratory CRUSHERS

29 in 3 YEARS!



SUPERIOR primary and secondary gyratory crushers have been making a big name for themselves since they were introduced three years ago. Twenty-six are installed and operating... three are under construction now, including a huge 60 x 109 machine — largest crusher the world has ever known.

A policy of simplifying design and controlling quality has made Allis-Chalmers the leading builder of crushers. A continuing policy of *improving* crusher design has greatly extended this leadership.

This vast backlog of crusher application experience — over 75 years of it — is always available to you when you want to make sure of a successful installation. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4319

Superior is an Allis-Chalmers trademark.

NEW 32-Page Book Contains Helpful Crushing Data

Packed with factual "how to" information on figuring hp requirements, impact and compressive strengths.

Step-by-step procedures for estimating gyratory crusher sizes, capacities. Examples are worked out.

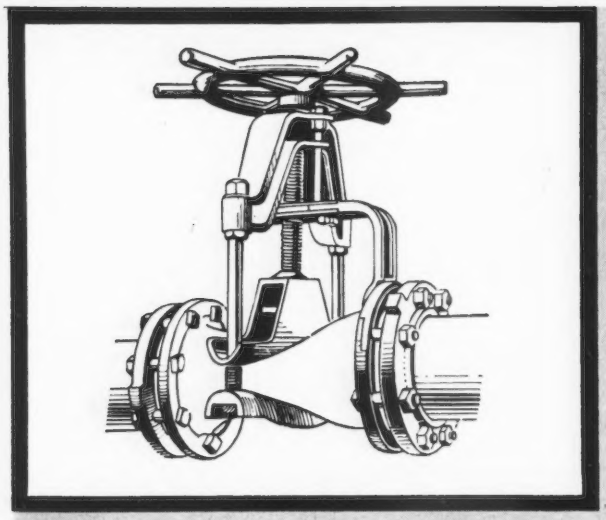
Many other valuable facts on gyratory crusher operation . . . application . . . engineering.

It's a book you'll want to have and keep!

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

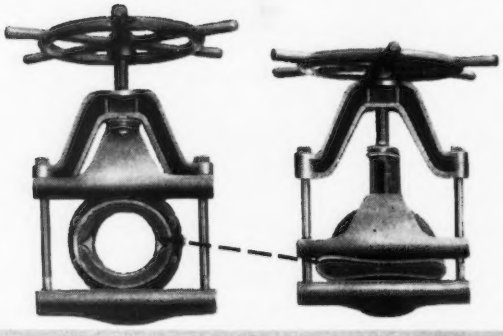


MASSCO-GRIGSBY rubber PINCH VALVES FOR ABRASIVE PULPS

IT'S HINGED...

FOR LONGER WEAR

Recesses molded into opposite sides of the sleeve serve as "hinges" during compression. This patented feature prevents undue strain and eliminates breakage and excessive wear due to valve adjustments.



MOLDED RUBBER RESISTS ABRASION

...gives Long Life without Maintenance

The sleeve is made of molded natural rubber reinforced with fabric; will withstand pressures to 150 lbs. per sq. in., temperatures to 180° F; freezing temperatures are not harmful.

The Massco*-Grigsby Rubber Pinch Valve has a straight, unobstructed flow passage which eliminates high friction losses; there are no packing glands; gives positive, leak proof closure; withstands all chemicals not harmful to rubber or neoprene.

Sizes: 1", 1½", 2", 3", 4", 5", 6", 8", 10", 12", 14"

*Both Marcy and Massco are registered trademarks.

WRITE FOR CATALOG

The Mine & Smelter Supply Co.

DENVER 17, COLORADO

OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

REPRESENTATIVES IN FOREIGN COUNTRIES

It's a Fact!

JOY AXIVANE® MINE BLOWERS

produce more air per horsepower

You don't have to make complicated tests to check the efficiency of Joy blowers. Just compare the performance data we can quickly make available to you with the published performance data of conventional mine blowers. That will give you positive proof that the mechanical efficiency of Joy blowers is unexcelled for high or low pressure operations.

Moreover, the pressure range in which AXIVANE blowers operate with unequalled efficiency is so wide that it is totally unnecessary to have one type of blower for short lengths of tubing and another type for longer lengths. The Joy AXIVANE mine blower will operate through any length of tubing with high efficiency.

Built in two sizes (3 and 5 H.P.) to handle most blowing jobs. For greater duties, AXIVANE fans from 5 to 3000 H.P. are available. ● Write for data—let us work with you.

AERODYNAMIC DESIGN

The blades of Joy blowers are of airfoil shape, similar in cross-section to an airplane wing. Rotors are of cast-aluminum construction, permitting accurate adherence to the design shape. Both the number and shape of the blades and stationary vanes are mathematically determined to insure greatest efficiency. The minute clearance between blade-tip and blower casing eliminates most tip loss, a common cause of fan inefficiency and noisy operation.

VANEAXIAL CONSTRUCTION

Joy blowers have stationary vanes to recover the rotative energy imparted to the air by the rotor. The airflow from AXIVANE blowers is therefore substantially axial. The unequalized outlet pressures of all other fan types create non-axial, turbulent airflow, which is wasteful of power. Joy blowers consequently give you a more favorable electric-to-air-power ratio, and are relatively quiet in operation.

Consult a Joy Engineer

W&D M 3752

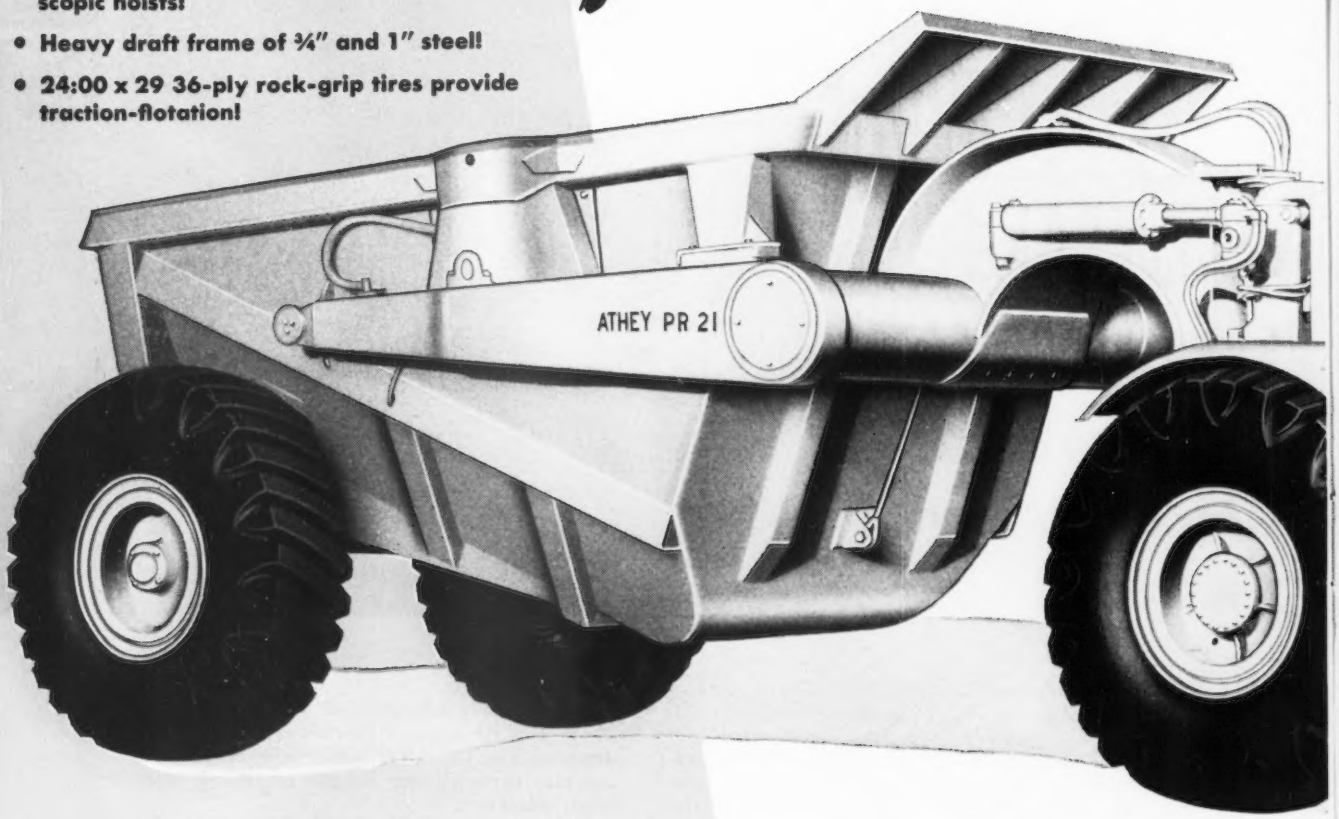
JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Presenting

- **All controls in easy reach!**
- **Powered by 275 HP (ASME peak rating) Cat Diesel!**
- **Anything that goes in will come out!**
- **Low height, wide body for fast loading!**
- **Hydraulic steering retains feel-of-the-road!**
- **Operated by powerful Athey 3-stage telescopic hoists!**
- **Heavy draft frame of ¾" and 1" steel!**
- **24:00 x 29 36-ply rock-grip tires provide traction-flotation!**

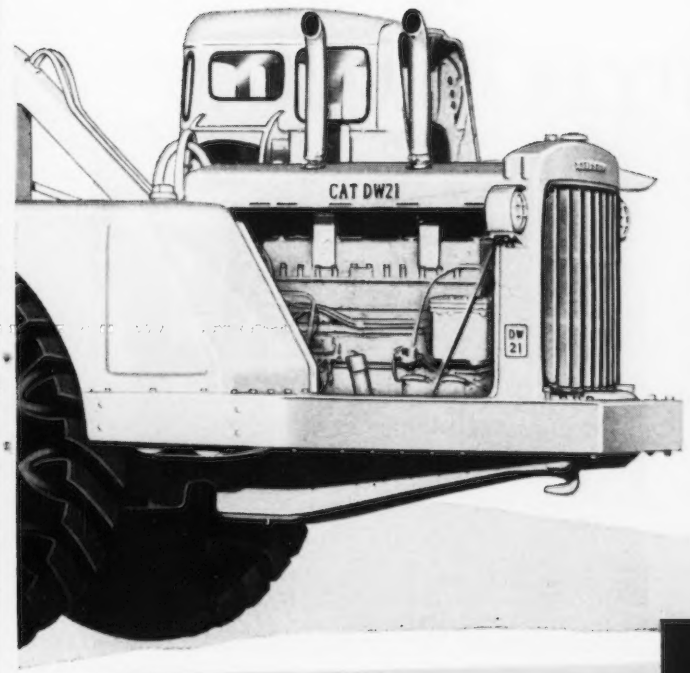


LOADING . . . *Wide-mouthed body (14' x 10') makes an easy target for fast-swinging shovels. Bottom is a sandwich—¾" high-strength steel top plate, oak-plank filler, ½" bottom plate. Heavy side sheets are reinforced with box-sections.*

HAULING . . . *Hauls are made at speeds up to 20 MPH. Low center of gravity and wide tread (123") provide exceptional stability at high speeds. Positive, hydraulic steering control keeps the operator in command of the unit. Body design allows capacity load without spillage.*

the *NEW* ATHEY PR21
REAR-DUMP TRAILER

The rock-hauling companion for the **CAT** *DW21 Tractor!*



The high-speed Cat DW21 has a new production teammate—a hydraulically-controlled trailer that can take on a heaped load of hard rock, haul at speeds up to 20 MPH, and dump the load over steep banks in complete safety. The new high-production, high-profit, rear-dump hauler is the Athey PR21 Trailer.

The PR21 is built of high-strength steels to take anything rock can dish out. All-welded, frameless design reduces and absorbs the twist and torque of rock loading, hauling and dumping. The PR21 matches its DW21 teammate in capacity, performance and dependability—a combination that pays off in production and profits.

Your Athey-Caterpillar Dealer has complete specs and performance data. See for yourself why the new PR21 assures trouble-free work schedules and profitable production. Call on him or write direct to

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5631 West 65th Street
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DUMPING . . . *Body tilts, under hydraulic control, 60° to dump any load cleanly. Individual 22" x 7" tractor and trailer brakes provide extra margin of safety. 90° turns eliminate lengthy maneuvers on the fill, permit turns in 34 feet!*

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Please rush specs and literature on the new high-production PR21 Rear-Dump Trailer.

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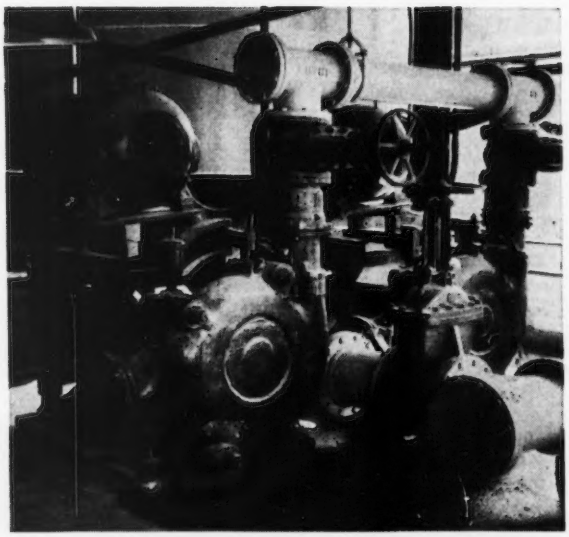
from Primary Slurry to Tailings

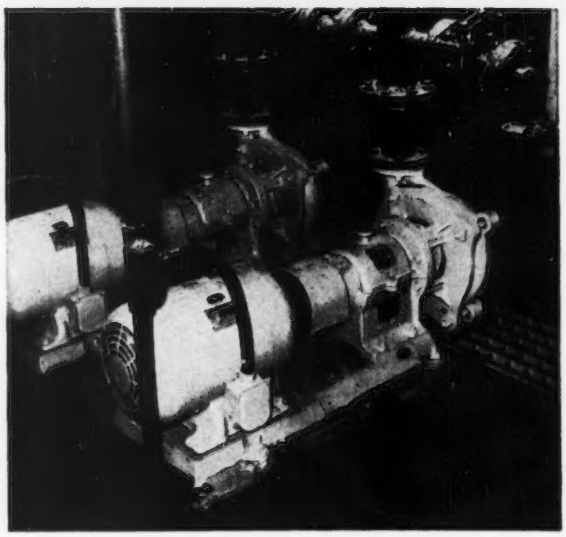
In this new southern phosphate plant, dependable WILFLEY pumps handle difficult pumping jobs efficiently and economically. Materials handled include acid, hot acid sludge and phosphate tailings. Wherever installed, these famous pumps—both Acid and Sand—consistently increase production and create substantial dollar savings in power and maintenance.



Wilfley Acid Pump

"COMPANIONS IN ECONOMICAL OPERATION"

Wilfley Sand Pump



- Cost-saving efficiency
- Stepped-up production
- Continuous operation without attention
- Minimum replacement of parts
- Designed for simple installation
- Economical pump size for every requirement

Individual engineering on every application. Write, wire, or phone for complete details.

A. R. WILFLEY & SONS, INC.

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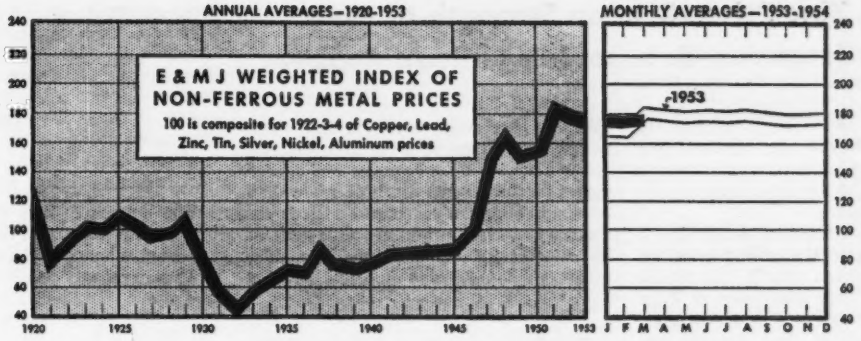
E&MJ OUTLOOK

PRICES


ANNUAL AVERAGES—1920-1953
E & M J WEIGHTED INDEX OF NON-FERROUS METAL PRICES
100 is composite for 1922-3-4 of Copper, Lead, Zinc, Tin, Silver, Nickel, Aluminum prices
MONTHLY AVERAGES—1953-1954
1953
J F M A M J J A S O N D

MARKETS

Rumors of stockpile relief for domestic zinc-lead miners (later confirmed) brought buyers into the market as March ended and sparked a smart recovery in lead and zinc prices. The upturn seemed certain to continue into April. Consumers, who always buy on a rising market, showed enough interest to push lead up ¼c per lb on April 1 to 13¾c, N.Y.

Tin was higher on continued optimism over the workability of the proposed control plan and on renewed tension over the Indo-Chinese war.

Copper markets were stiffened by the State Department's purchase of 100,000 tons of surplus Chilean copper, but the outlook is no clearer. Chile sold fair tonnages outside the U.S. late in March, and had no comment on how soon her copper would be sold on a "normal" basis.

All this pushed the *E&MJ* index of non-ferrous metal prices up to 179.58 for March, against 178.17 in February.

•

LABOR

CIO Steelworkers lost an NLRB election in Butte to Mine, Mill, and thereby lost tremendously in prestige and power in their drive to take locals away from the left-wingers. Not that Mine, Mill's leadership is on any bed of roses, but they have won a reprieve.

•

AT HOME

With both government and industrial expenditures likely to decline somewhat over the next few months, consumer expenditures will largely fix the course of business. The safest bet is that the public (that's you and I) will cling to its cash, awaiting lower prices. In other words, we expect a continued decline in business but no collapse.

Fabricators are still buying copper on a month-to-month basis, expecting a price decline eventually. However, producers are moving to keep output in fair balance with consumption, and unless a general depression develops, 30c copper may be here for quite some time.

National Lead has developed a magnetic sintering process in Norway that Republic Steel will use in a joint venture to upgrade Alabama hematite.

Stepped-up stockpiling, billed as a strategic necessity, is largely an aid-to-mining measure, adopted to head off a demand for higher tariffs. It's a shot in the arm, all right, but it may yield a long-term headache. Higher prices may arouse more imports, curtail domestic sales, require still more stockpiling, put the industry at the Government's mercy.

•

ABROAD

Reopening of free trade in gold in London March 22 doesn't mean it's any nearer in the U.S. London dealers simply wanted the old-time commissions on gold sales, and they finally got their point across.

MARKETS—Trends and Prices

Lead and Zinc Prices Rise on Strength of New Stockpile Program—U. S. to Buy Chilean Copper

THE TREND IN BUSINESS in nonferrous metals during March was upward, due in part to natural causes, as the coming of spring, and also to active intervention by the Government.

Rumors were circulated early in the month that a new stockpiling program was to be announced shortly that would result in fairly large purchases of both lead and zinc. President Eisenhower, on March 26, authorized the Office of Defense Mobilization to establish immediately new "long term" mineral stockpile objectives. The President's Mineral Policy Committee previously had recommended such a program to strengthen the domestic mineral industry. It was estimated that the new program will result in additional purchases of from 35 to 40 metals and minerals. If possible, the purchases are to be made from domestic sources and spread over a considerable period of time.

Producers and consumers felt that additional stockpile purchases, which could begin shortly, will relieve the market of surplus metal and raise prices. Consumers entered the market for substantial tonnages of lead and zinc and both metals scored a net gain for the month of 1c per pound. Domestic copper remained unchanged.

The State Department announced March 25 that it has agreed with the Chilean Government on the general provisions of a purchase of 100,000 tons of copper at the market price for the U.S. strategic stockpile. Details of the contract will have to be worked out by the GSA and the two major Chilean producers. At the time the announcement of the stockpile agreement was released in Washington, the Chileans were still debating on the measure that is to establish a more realistic policy affecting both production and marketing of its copper.

Metals Index Rising

The recovery in lead and zinc, along with higher tin, caused the *E&MJ* index of nonferrous metal prices for March to rise 1.41 points to 179.58. A year ago it stood at 184.44. The strength in prompt tin was caused to some extent by the strike of dock workers in the New York area.

Industrial production for March, as measured by the Federal Reserve Board's index, was estimated at 122% of the 1947-49 base period. This compares with a preliminary figure of 123 for February and 125 for January. A year ago, industrial activity was estimated at 135.

The operating rate of the steel industry as March ended was down to 68% of capacity, against 97.1% a year ago. The drop in output accounted for the conservative buying policy of the steel industry that has prevailed over the last three months. Purchases of manganese ore and chrome ore have been meager and quoted prices on these items are little more than nominal. Tungsten ore staged a moderate recovery as many producers pulled out of the market for better prices. The sales agreement between South Korea and the U.S. expired on March 31.

The Du Pont Co. announced its first reduction in the price of sponge titanium since 1948. Effective April 1, it established a price of $4.72 a pound for metal containing a maximum of 0.3% iron, and $4.46 a pound for 0.5% iron. The old price was $5. Improvements in process and expansion in capacity were responsible for the reduction.

Prompt Copper Firm

With producers here apparently in complete control of the price situation in copper because of adjustments in production that more or less offset a reduced rate of consumption, quotations were maintained throughout March at the 30c level. Custom smelters have unexpectedly encountered keen competition for the available supply of scrap and they have been forced to pay higher prices to obtain copper-bearing material. Exporters have been hot after all forms of secondary material and shipments of scrap copper to Germany and Japan have increased substantially.

Consumers in the U.S. are still buying copper on a month-to-month basis, which points to continued caution over the outlook. During February, fabricators in the U.S. shipped products that contained 93,342 tons of copper. This compares with 100,805 tons shipped during January, 83,652 tons in December, and 123,850 tons in February of last year.

U.S. mine output is being reduced at most properties by returning to the shorter work week. Some experts believe that production in the near future will fall to around 65,000 tons or less a month. Monthly average production in 1953 was 77,000 tons.

Stocks of refined copper in the hands of U.S. producers at the end of February totaled 118,417 tons, which compares with 60,944 tons a year ago.

Offerings of nearby copper in the European market were light and speculators encountered trouble in covering against sales made some time ago. Demand throughout Europe, including the United Kingdom, has been increasing, reflecting general improvement in business. Countries behind the Iron Curtain have been obtaining copper and copper products on an expanding scale, which no doubt accounts for some of the increased activity at fabricating plants situated elsewhere in Europe. News of the agreement on the sale of 100,000 tons of Chilean copper to the U.S. Government was received favorably by producers. But as the month ended the industry became concerned about a strike called at Roan Antelope, an important Rhodesian producer.

Lead Price Recovers

The depressed lead industry came to life on assurances that the U.S. will enter the market for additional supplies for its strategic reserve. This brought consumers into the market and the price advanced a full cent during March to 13½c, N.Y. (On April 1, the quotation was advanced one-quarter cent, raising the price to 13¾c).

Stocks of refined lead at U.S. refineries totaled 97,981 tons at the end of February, which compares with 58,949 tons in February a year ago.

Zinc prices rose to 10¼c shortly before the month ended, also on the

Average Prices for March (E&MJ Quotations)

Copper:	
Electrolytic, domestic, refinery	29.686
Electrolytic, export, refinery	29.168
Lead:	
Common, New York	12.935
Common, St. Louis	12.735
Silver and Sterling Exchange:	
Silver, New York, per oz.	85.250
Silver, London, pence per oz.	73.728
Sterling Exchange, "Checks"	281.448
Zinc:	
Prime Western East St. Louis	9.637
Prime Western, delivered (g)	10.137
Tin:	
New York Straits	91.833
New York, 99% min. (e)	90.833
Gold, per oz. U. S. price	$35.000
Quicksilver, per flask	$200.444
Antimony (E&MJ) (d)	31.970
Antimony, bulk, Laredo	28.500
Antimony, in cases, Laredo	29.000
Platinum, refined, per oz.	$86.889
Cadmium (a)	170.000
Cadmium (b)	172.500
Cadmium (c)	175.000
Aluminum, 99% plus, ingot	21.500
Magnesium, ingot	27.000
Nickel (f)	60.000

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lb.
(a) Cadmium average based on the producers' quotations.
(b) Cadmium average based on the average of the producers' and platers' quotation.
(c) Cadmium average based on platers' quotation.
(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.
(e) Tin content.
(f) F.o.b. Port Colborne, U.S. duty included.
(g) Delivered where freight exceeds 0.5c.

Markets Continued on Page 106

strength of the new stockpile program. It looked as if the Administration has selected stockpiling as the best method for extending immediate aid to the industry. However, domestic mine operators still favor a higher import duty.

Tin continued to rise on favorable prospects for ratification of the international control plan by producing countries. Political tension over developments in Indo-China also was a factor. Prompt tin sold at a premium in New York because of the dock strike.

The supply situation in aluminum has eased and producers are going after new outlets for the metal to absorb the record output.

"Free" Gold Market

The volume of gold sales in the free market increased about 80% during March. Prices were unsettled. The Russians so far sold 45 and 50 tons of gold in London and Western European countries. Major event during the month was the reopening of London's gold market on March 22. London is working toward regaining its former position as a trading center in gold.

	COINS		BARS (12.5 kg.)	
	Feb. 26	Mar. 31	Feb. 26	Mar. 31
NEW YORK, transit	.....	.....	$35.15	$35.05
MANILA	$41.25	$40.50	36.75	38.00
HONG KONG	41.25	40.75	37.25	37.00
BOMBAY	49.00	49.50	48.00	48.50
TANGIER	41.25	40.15	37.10	35.05
BEYROUTH	39.75	40.10	35.25	35.15
PARIS	42.40	39.50	35.70	35.45
BUENOS AIRES	41.75	40.20	39.00	38.00

Note: All prices are computed at the free or black market value of the U. S. dollar in the local markets

Major Metals

U. S. DAILY AND AVERAGE PRICES

Mar. 1954	Electrolytic Copper (a) Domestic	(b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc Delivered (f)	Zinc East St. Louis
1	29.650	29.050	86.750	12.500	12.300	9.750	9.250
2	29.700	29.125	86.750	12.500	12.300	9.750	9.250
3	29.700	29.200	86.750	12.500	12.300	9.750	9.250
4	29.650	28.950	87.250	12.500	12.300	9.750	9.250
5	29.700	29.200	87.250	12.500	12.300	9.750	9.250
6	No Market	28.925	87.250	12.500	12.300	9.750	9.250
8	29.675	28.975	90.250	12.500	12.300	9.750	9.250
9	29.700	29.025	90.000	12.750	12.550	9.750	9.250
10	29.700	29.075	90.000	13.000	12.800	9.750	9.250
11	29.700	29.175	90.500	13.000	12.800	10.250	9.750
12	29.700	29.350	92.500	13.000	12.800	10.250	9.750
13	No Market	29.275	92.500	13.000	12.800	10.250	9.750
15	29.650	29.300	93.500	13.000	12.800	10.250	9.750
16	29.675	29.225	92.500	13.000	12.800	10.250	9.750
17	29.675	29.350	92.000	13.000	12.800	10.250	9.750
18	29.675	29.225	93.750	13.000	12.800	10.250	9.750
19	29.675	29.125	94.500	13.000	12.800	10.250	9.750
20	No Market	29.125	94.500	13.000	12.800	10.250	9.750
22	29.700	29.300	94.500	13.000	12.800	10.250	9.750
23	29.650	29.200	94.000	13.000	12.800	10.250	9.750
24	29.700	29.300	94.000	13.000	12.800	10.250	9.750
25	29.700	29.275	94.000	13.000	12.800	10.250	9.750
26	29.700	29.475	94.000	13.250	13.050	10.250	9.750
27	No Market	29.125	94.000	13.250	13.050	10.250	9.750
29	29.700	28.975	95.500	13.500	13.300	10.700	10.200
30	29.700	29.150	95.500	13.500	13.300	10.750	10.250
31	29.700	29.050	95.500	13.500	13.300	10.750	10.250
AVERAGES FOR MONTH							
Mar.	29.686	29.168	91.833	12.935	12.735	10.137	9.637
AVERAGES FOR WEEK							
Mar.							
3	29.685	29.008	85.958	12.500	12.300	9.750	9.250
10	29.685	29.025	88.667	12.625	12.425	9.750	9.250
17	29.680	29.279	92.250	13.000	12.800	10.250	9.750
24	29.680	29.213	94.208	13.000	12.800	10.250	9.750
31	29.700	29.175	94.750	13.333	13.133	10.492	9.992
CALENDAR WEEK AVERAGES							
Mar.							
6	29.680	29.075	87.000	12.500	12.300	9.750	9.250
13	29.695	29.146	90.958	12.875	12.675	10.000	9.500
20	29.670	29.225	93.458	13.000	12.800	10.250	9.750
27	29.690	29.279	94.083	13.083	12.883	10.250	9.750

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

Mar. 1954	Sterling Exchange "Checks"	Silver (c) New York	Silver (c) London	Gold London	Gold (d) United States
1	281.3750	85.250	73.750d.	248s.	$35.00
2	281.4375	85.250	73.750d.	248s.	35.00
3	281.4375	85.250	73.750d.	248s.	35.00
4	281.3750	85.250	73.750d.	248s.	35.00
5	281.3750	85.250	73.750d.	248s	35.00
6	(e)	(e)	(e)	(e)	35.00
8	281.3750	85.250	73.750d.	248s.	35.00
9	281.3750	85.250	73.750d.	248s.	35.00
10	281.3750	85.250	73.750d.	248s.	35.00
11	281.3750	85.250	73.750d.	248s.	35.00
12	281.3750	85.250	73.750d.	248s.	35.00
13	(e)	(e)	(e)	(e)	35.00
15	281.3750	85.250	73.750d.	248s.	35.00
16	281.4375	85.250	73.750d.	248s.	35.00
17	281.4375	85.250	73.750d.	248s.	35.00
18	281.5000	85.250	73.750d.	248s.	35.00
19	281.5000	85.250	73.750d.	248s.	35.00
20	(e)	(e)	(e)	(e)	35.00
22	281.5000	85.250	73.750d.	(f)248s. 6d.	35.00
23	281.5000	85.250	73.750d.	248s. 4d.	35.00
24	281.5625	85.250	73.750d.	248s.3½d.	35.00
25	281.5625	85.250	73.750d.	248s.3½d.	35.00
26	281.5000	85.250	73.625d.	248s. 4d.	35.00
27	(e)	(e)	(e)	(e)	35.00
29	281.5000	85.250	73.625d.	248s.5½d.	35.00
30	281.5000	85.250	73.625d.	248s.5½d.	35.00
31	281.5625	85.250	73.625d.	248s.5½d.	35.00
AVERAGES FOR MONTH					
Mar.	281.448	85.250	73.728d.	—	35.00
AVERAGES FOR WEEK					
Mar.					
3	281.400	85.250	—	—	—
10	281.375	85.250	—	—	—
17	281.400	85.250	—	—	—
24	281.513	85.250	—	—	—
31	281.525	85.250	—	—	—

Calendar Week Averages, New York Silver: March 6th, 85.250; 13th, 85.250; 20th, 85.250; 27th, 85.250.

(e) No market (Saturday).

(f) Beginning March 22nd, open market quotation.

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c to 0.15c per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered, in the East, Middle West, and West, effective Jan. 1, 1951, commanded a premium of 1.35c per pound over the current market for Prime Western; Special High Grade 1.50c.

(f) Prime Western delivered where freight from E. St. Louis exceeds one-half cent.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

(c) The Daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, as reported daily by regular suppliers, and is usually one quarter-cent below the price paid for such bar silver, this deduction being the allowance to such suppliers for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c per troy ounce 1000 fine, effective July 1, 1946. London silver is pence per troy ounce, basis .999 fine.

(d) U.S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Behind the By-Lines...

G. P. Lutjen

Man! This is one of those months that sends us rustling through our pants pockets for any old, unused airplane tickets to Acapulco. Maybe it's the Spring. Or maybe it's the places we've been hauled around to, in editing this issue. Canada, Mexico, Ireland and Turkey are among the ports of call. We think that you'll find something interesting and/or helpful at every stop. Steward, don't call us till the boat docks.

Subtitle of the lead article this month could well be "Tom Ware and His Bigger Digger," not to be confused with "Tom Swift and His Electric Rifle" or Tom Swift and His Anything. International Minerals & Chemical's new dragline is a tremendous accomplishment and Tom Ware rates a passel of applause. Sound engineering, progressive ideas and modern design have been parlayed to build a safer, more efficient digging unit.

Take a look at that cab on the cover! It's literally an executive's office; an executive with an expensive piece of machinery under his control, and day-to-day mining operations at his finger tips.

We are pretty enthusiastic about this development. In fact we go so far as to climb out on a limb in predicting that it will start a major trend in heavy equipment. A "revolution" is what we call it on the cover. For the first time anywhere, the details start on p 72, with drawings and pictures. Sorry, no Stereophonic sound.

It was only last December that News Editor Jack Kearney packed his warming pan, donned his chinchilla T-shirt and set out for the snow-blanketed mountain fastness of British Columbia to get the facts for a story on Alcan's minor miracle up there. All the information can be found on the 8 pages starting at p 78.

Kearney was most impressed by Alcan's ambitious alteration of Mother Nature's local establishment. Changing the flow of whole lakes, tunneling miles through mountains and similar pranks, somehow reminded him, he says, of a story about the late Al Jolson, who possessed one of the sharpest wits in show business.

Jolson was a guest of Moss Hart at the latter's estate in Bucks County, Pa., and was being escorted on the deluxe guided tour about the grounds. "See that hill," Hart would say, "It used to be on the other side of the road, but we wanted the house to be in the lee of a hill so I had a couple of bulldozers come in and move the hill over.

"See that little stream running past the porch? It used to flow down by the barn, so I had it diverted to where we could look at it while sitting on the porch in the evening.

"How do you like that row of oak trees along the driveway? They used to be scattered all over the place but we thought they'd look nicer lined up."

When the tour was over, Hart turned to Jolson for his comment. Jolson shook his head in wonderment. "Just think," he murmured, "What God could have done if He'd only had the money!"

For the enjoyment of those lads with a touch of the Ould Sod, and for the enlightenment of the uninformed who think that only peat and potatoes are mined in Ireland, we invite one and all to take a look at the *E&MJ* Special Report on p 86. Gerald Moorhead of Silvermines Lead & Zinc Co. does a fine job of covering the lead-zinc situation in Erin. We owe thanks, too, to the Irish Tourist Bureau for furnishing us with a fine broth of a map with which to locate places mentioned in the report. We noted, incidentally, that the colleen who handled the deal on the telephone referred to the six counties northward as "Occupied Ireland."

Metal salesmen may be surprised—we sure were—to see the name of a St. Joe vice-president on the map of Turkey on p 92. How and why, we don't know, but there it is;—C. Ince. Only the C is for Cape. Actually that geographic unit has no particular significance as far as the article on Turkish chromite mining is concerned, but we couldn't resist the opportunity of putting one of our contributors on the map, so to speak. (Mr. Ince has prepared our annual zinc review for years.) Now if someone will just discover some zinc on the Cape, we'd really have a story. Or maybe there's enough zinc around already.

Lone Star Steel Co. of Texas, of course, has hit this column before. This time there is an account in their excellent house organ, "Starlight," of an incident that took place in the First Aid classes they are holding for the plant firemen. We think it's worth passing along.

It seems that one day, one of the firemen reported to work complaining of a stomach ache. The eager students took the situation under consideration. Gently they laid the fireman on the cot and then withdrew for consultation. There was much whispering, the first aid manual was consulted, and then they resorted to the medicine cabinet.

Finally two firemen approached their ailing colleague, absolutely deadpan, and gently unbuttoned his shirt to expose the ailing tummy. The first man placed an aspirin in the patient's navel; the second then covered it with a band-aid.

An old railroad engineer had just pulled his locomotive up to the water tank. The young fireman mounted the tank and brought down the spout. Unfortunately, his foot got tangled and he stepped right into the tank.

"Son," drawled the engineer, "just fill the tank with water. You don't have to stomp it down."

ENGINEERING AND MINING JOURNAL

APRIL 1954

Driver's Seat For Revolution

THE EMPTY CHAIR shown on the cover of this issue is actually only the operator's seat in the new control cab on one of International Minerals & Chemical Corp.'s big draglines in the Florida phosphate field.

Potentially, that chair is the starting point for a revolutionary new approach to the whole program of operating mining, milling, and smelting processes throughout the world.

Sparked by Tom Ware, IMC's vice-president in charge of engineering, development of this control cab marks the successful use of the newest engineering and scientific techniques in solving a management problem in the mining field.

Part of the job called, of course, for simple common sense, such as relocating the operator so he could see all parts of the area in which he works.

Part of the job called for intricate and difficult electrical design to work out instruments that would tell the operator immediately and accurately what the dragline was doing.

Part of the job called for developing smoothly synchronized controls that would let the operator handle the 17½-yd dragline as easily as he might drive his car.

The entire job has resulted in a vastly improved control center that could mean substantial savings for IMC, and that should mean much food for thought for anyone who operates heavy mining machinery.

Free Trade Must Come Slowly

IN THE MANY DISCUSSIONS we have had lately on the problems of foreign trade, we have found no disagreement with the general thesis that it is beneficial to work toward world-wide reduction of tariffs and increased trade.

The values of a free exchange of the world's goods and currencies are so vast and so obvious that there is little point in running over them once more.

The issue we are dealing with here, therefore, is not one of free trade vs. tariff barriers, but of how, and how fast, does this country work toward a freer and mutually more profitable trade with other nations.

A friend of ours, in a private communication commenting on the Randall Commission report, recently reminded us of the danger of too precipitate an action on expanding imports into the U.S.

The Randall report, he said, "was a rude awakening for those who were comfortably snuggling up with the illusion that expanding world trade meant a net increase in business for local industry.

"Coming in 1954, when domestic manufacturers can turn out more than enough to meet the demands of United States markets, any increase in imports must necessarily be at the expense of domestic production."

This, of course, is a comparatively narrow view, as compared with the view of an economist, who sees that exports are also necessary to a healthy U. S. economy, that the U. S. can export only if other nations can buy, and that other nations can buy only if they have dollars to spend. They get dollars mainly by selling goods in the U. S.

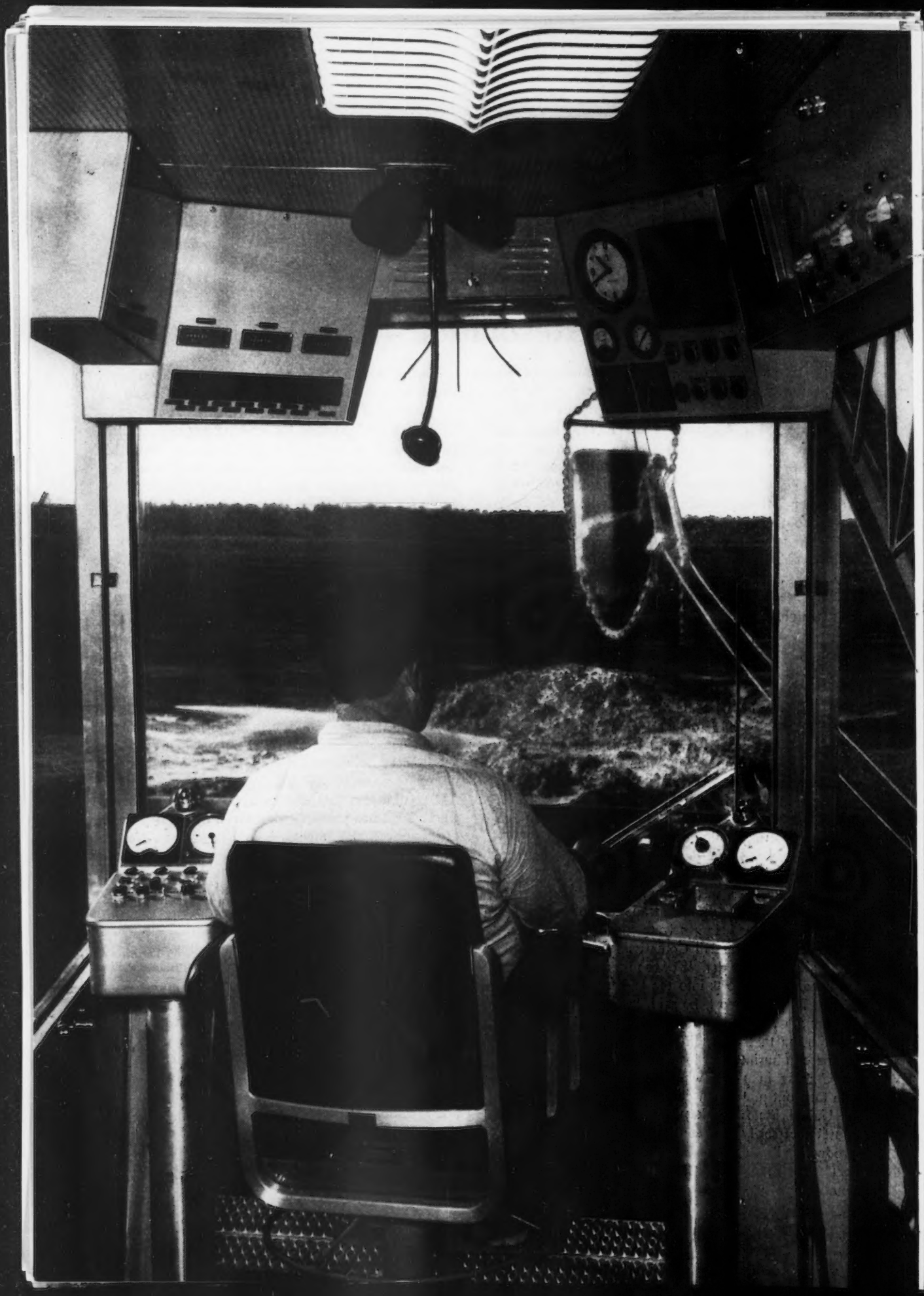
To point this fact out to a U. S. zinc producer whose mine has just been shut down owing to a flood of low-priced zinc imports is not, however, a way to win friends and influence people.

Somehow a way has to be found to develop foreign trade beyond its present levels without severely injuring basic U. S. industries in the process.

From the standpoint of national security, too much depends on keeping these basic industries strong to permit them to be injured, perhaps permanently, in order to rapidly establish a policy of "Trade—Not Aid."

Many industry members look hopefully to the President's Committee On Mineral Policy for an answer that may help develop both a healthy mining industry in the U. S. and a flourishing trade with other nations.

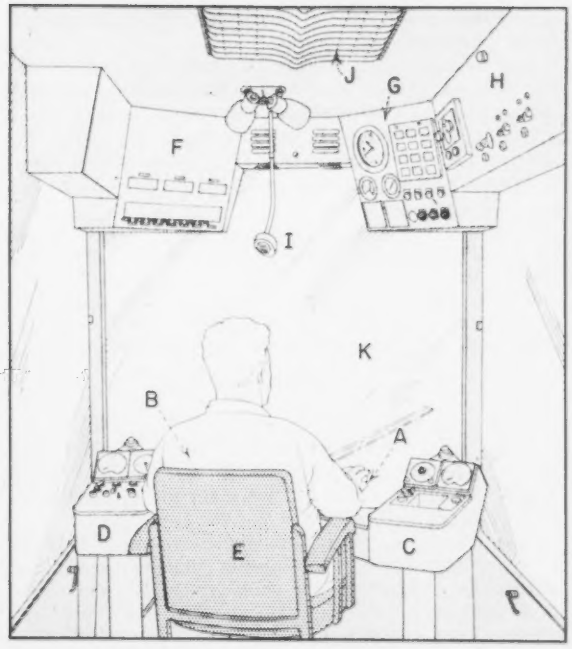
This is so large an order that it is difficult to mention it without considerable misgivings. Yet if the mining industry doesn't help come up with answers to these problems, there are plenty of others who will. We doubt if any of us would be happy with these latter solutions.



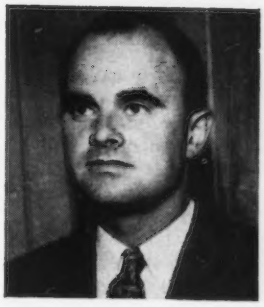
Revolution In Control

How scientific studies of mining with big draglines in Florida phosphate field have done these things:

- **Simplified dragline control.**
- **Greatly increased potential productivity.**
- **Shown how to improve all mechanized mining.**



KEY TO NEW CAB International Minerals & Chemical Corp. builds for its draglines is: A, hoist-swing control lever; B, drag control (operator's left hand); C, digging control indicators; D, switches, drag indicators; E, movable chair; F, tonnage totalizers; G, "trouble-spot" indicators; H, radio cabinet; I, microphone; J, fluorescent lighting; K, plate glass windshield with wipers.



Thomas M. Ware

Enthusiastic and imaginative, Tom Ware, vice-president in charge of engineering for International Minerals & Chemical Corp., never sits still, never stops thinking of new things to try. You'll hear more of his ideas in the future, some of them even more far-reaching than this new control cab.

R. H. RAMSEY, Editor

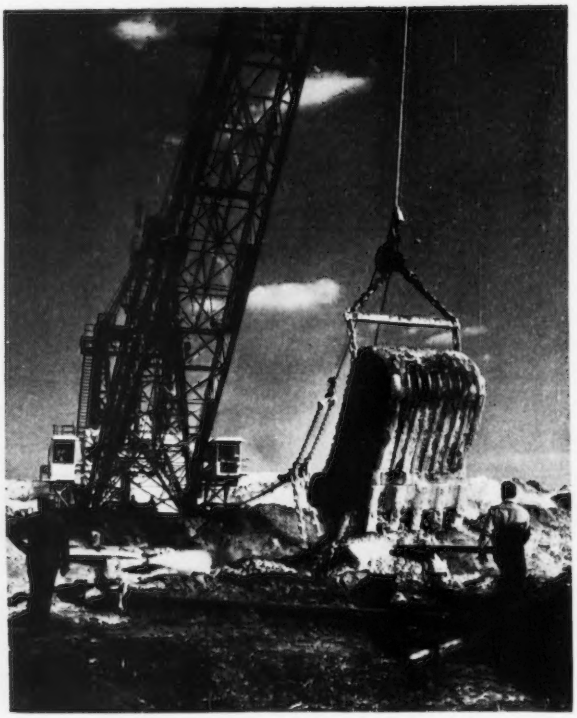
THIS IS THE STORY OF TOM WARE'S REVOLUTION, or at least the beginning of it. Nobody can say just how far this revolutionary new method of control of mining machinery can go.

One can be sure, however, that when International Minerals & Chemical Corp.'s engineering division developed the new dragline control center shown opposite, they opened a pathway to improved mining methods that every mine management, open pit or underground, should be alert to explore.

Note Melvin Mathers' relaxed attitude, on the opposite page. He is operating a 17½-yd. dragline as easily, and a good deal more comfortably, than he drives his car.

That is the revolutionary fact. Scientific study of the problem of securing optimum dragline performance has shown how to redesign both the dragline's control system

BEFORE CHANGE, operator was in cab hidden behind boom structure, often experienced difficulties as a result.



AFTER CHANGE, operator has clear field of view of bucket at all times, can spot dragline safely and accurately.

and the operator's cab to produce these two results:

1. Give the operator quickly all the information he needs to handle the dragline most efficiently.
2. Give the operator complete visual and manual control over the machine in the simplest and most effective way.

How It Started

The dragline now equipped with this new cab design is operated by International Minerals & Chemical Corp. in the Florida phosphate field. Its operators owe this comfortable position and their new ease and precision of control primarily to the driving energy and imagination of Thomas M. Ware, I. M. C.'s vice-president in charge of engineering.

In the course of studies his division continually makes of all phases of the company's activities, Tom Ware became convinced about three years ago that operation of the company's fleet of draglines in Florida could be improved by application of certain new principles of operation and control that were being tried out by a few forward-looking industrial companies.

The simplest expression of one of Tom's ideas lay in his favorite comparison of the dragline operator at work and on his way to work. The operator might well drive to work in a car with power steering, power brakes, windshield washers and wipers, a radio, a heater, even air conditioning. At work he had none of these things, although all of them could have helped him do a better job.

Why take a man out of a modern setting and put him into a horse-and-buggy environment when he starts work? Which is more important: how a man rides to work, or what he does when he gets there? Tom made up his mind to modernize the dragline operator's job in keeping with the car he drove to get to it.

What The Draglines Do

At first glance, the mining operations of International Minerals & Chemical Corp. in Florida look quite simple. Big draglines, like the one shown on p 75, remove overburden from the flat-lying beds of phosphate rock. Then they go on to dig the so-called "matrix," phosphate-bearing material.

The draglines dump the matrix into sumps spotted at intervals near the shovel cuts, and it is pumped from there to treatment plants, where a complex flotation process produces a phosphate concentrate.

For this discussion, however, the only important point is that it be made clear that a multi-million dollar operation is dependent on one man, the operator of the dragline.

He is responsible for the efficient, safe, continuous operation of a machine costing over $1-million, and his actions materially affect every other part of the phosphate production cycle.

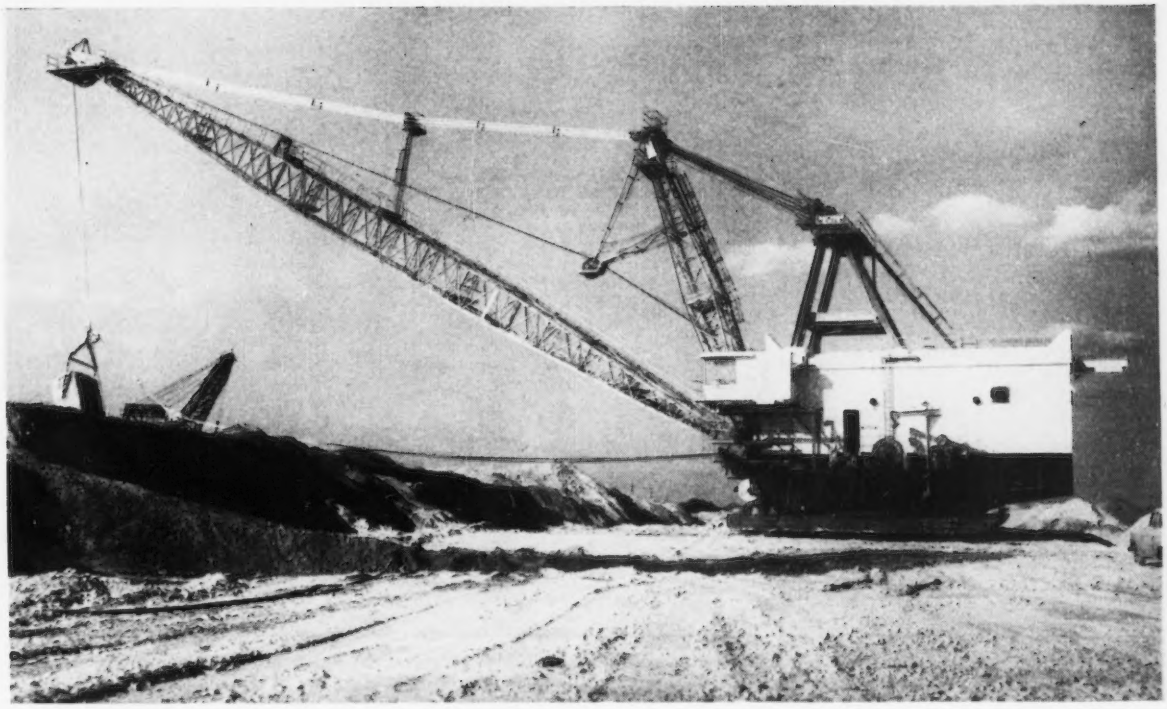
It seemed clear to Tom Ware that with so much depending on optimum operation of the dragline, it should be possible to secure greater productivity by making the shovel operation as efficient as possible. To do this called for better control, and to achieve better control a scientific study had to be made of all elements of the dragline operation.

Human Engineering Comes In

Backing up his beliefs in newer scientific developments with the push it takes to get them accepted, Tom Ware engaged Dunlap and Associates, Inc., a research-consulting firm of Stamford, Conn., to work on the problem. Two lines of attack were used.

First, Dunlap and Associates studied control of the dragline, applying to it the principles of "human engineering" that the firm's president, Dr. Jack W. Dunlap, has helped to develop. This first study led eventually to the control cab features pictured in this article.

Second, a complete analysis was made by Dunlap and Associates of the shovel operation, mathematically, to determine the most efficient combination of all the variables that apply under any given set of digging conditions. This job of "operations research" has yielded most interesting results but is beyond the scope of this present article.



REAL CONTROL over $1-million dragline is possible with operator's new position giving good visibility, precise information, comfortable working place, accurate, easily-operated controls. This is "Tillie the Toiler", 17½-yd. bucket, 185-ft. boom.

Human engineering may be regarded as the design and layout of equipment with the abilities and limitations of the human operator in mind so that the man-machine system that results will develop the greatest possible efficiency.

Human engineers apply, in a systematic way, the knowledge and techniques of fields such as psychology, physiology, industrial engineering, and probability statistics. Their aim is to design equipment that can be operated easily, quickly, accurately, and safely.

"Bio-mechanics" would probably be a more scientific name for human engineering activities but "common sense" seems to fit pretty well, especially after one has seen an example of human engineering at work. The best example that can be given here is to tell what the Dunlap study showed of the operator difficulties under which International Minerals & Chemical Corp.'s draglines were being run.

What Human Engineering Showed

Before getting into the results of the study, let's review briefly the basis of it. The Dunlap staff members were not concerned with the mechanical problems of building shovels, nor with the accepted methods of controlling them. They approached the problem of dragline control with only the idea of working out feasible means for enabling the operator to run his shovel easily, quickly, accurately, and safely. Let's look at the dragline operator through Jack Dunlap's eyes.

Dunlap saw a man with a million-dollar machine under his control, seated in an uncomfortable chair, exposed to the elements, unable to see what he was supposed to be doing for much of the time during which he was supposed to be doing it, and doing his job by awkward movements of both hands and feet that were at times difficult and fatiguing.

To any other shovel operator, here was simply a man running a dragline in the way draglines had always been run, but to Dunlap here was an opportunity for "common sense" human engineering to increase the man's effectiveness and job satisfaction at the same time.

To Tom Ware, here were ideas that fitted perfectly with his own concept of the modern, the right, way of doing a job.

The potential savings of the "right" way can be illustrated by the fact that if improved controls could cut only one second off the average swing time of the draglines, it would add substantially to the company's annual income in terms of finished product. Here are the points brought out in the I. M. C. study.

Visibility First

Almost at once, it was apparent that the operator's visibility was too limited to permit most effective shovel operation. His vision of the cut in which he was digging was obstructed by the position of the cab and by the position of his seat in the cab. The boom was in his way, as well as the catwalk on the boom and the catwalk in front of the cab. He couldn't see below or behind the shovel at all.

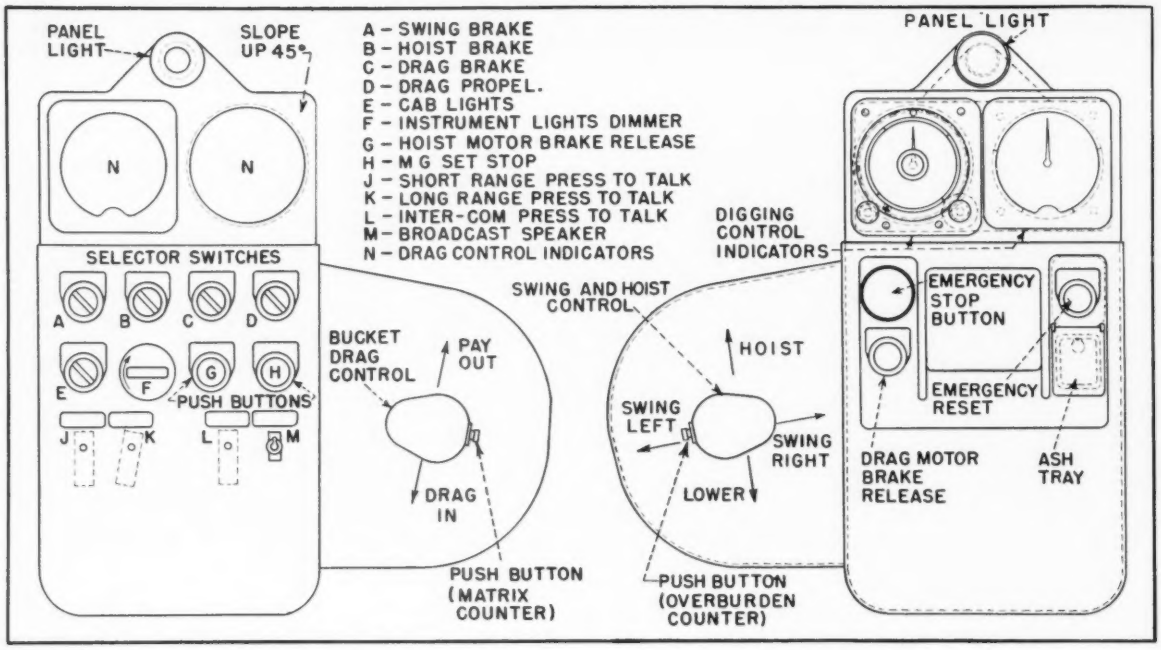
The result was that sometimes the drag chains were pulled into the fairleads or into the sheave at the end of the boom. At the least, these incidents caused expensive shutdowns, if not serious damage.

Improvement of vision was paramount for another reason. The operator must be able to determine whether he is digging to the proper depth in matrix and overburden, even when the bucket is as far as 235 ft away.

Comfort Next

Most operators questioned by Dunlap's staff complained first of the poor seat they had to sit in. Few complained of the difficulty of handling the controls because it didn't occur to them that it *was* difficult.

However, some did complain of their exposed location in rainy weather and of the drafts that blew down their necks when the generator blowers were on. True, there had



LAYOUT of operator's station in cab on 17½-yd dragline shows position of controls and instruments. Operator's hands rest on two control sticks (see photo opposite), arrows indicate motions that direct digging action.

been sliding windows to give the operators some measure of protection, but these were so hard to keep clean that they were slid open so the operators could see out. Once open, they couldn't be shut again without a struggle. The result was that rain or shine the operator took the weather, and the head colds, as they came.

Improved operator comfort was thus a second obvious corrective measure. As for the effect on productivity of increased comfort on the job, one has only to consult his own experience.

Easier Controls

Dunlap and his assistants observed that most operators, however skillful and experienced, tended to over-control in handling the dragline. They concluded that this had stemmed from the fact that control movements were not natural movements related to the desired movement of the shovel, and that some of them were quite difficult in that they required considerable physical energy.

Considering the narrow limits of overburden and matrix depth in which the shovels operate, and the great value of maximum digging time and minimum swing or down time, Dunlap felt that a simplified control system would yield greater precision in operation and greater productivity.

Better Information

Related to the control problem was the fact that the operator had the responsibility for safe, efficient operation of the dragline, but he had no accurate way of telling when things were going wrong.

To be most effective, and to discharge his responsibility properly, the operator should be able to talk easily with the oiler on the dragline, with the crew in the pit and on the bank, and with the plant office. He should know accurately how deep he is digging, how far he is swinging, how much tonnage he is moving per swing and per shift. And there should be automatic interlocks to prevent his pulling the chains into a sheave.

All this comes under the heading of supplying the operator with the information he needs in order to make his decisions quickly and correctly. With so much depending on the correctness of his decisions, this is only sensible management. The dragline operator in a job like this one is a vital production link and I. M. C. has recognized it by giving the operator the environment and the information he needs to run his job well.

Changes Are Made

After the Dunlap study was completed and the report carefully gone over by the company, Tom Ware and his engineering division went to work to design a new cab. In this they had, of course, the cooperation of Dunlap and Associates, as well as certain manufacturers, who handled special phases of the job.

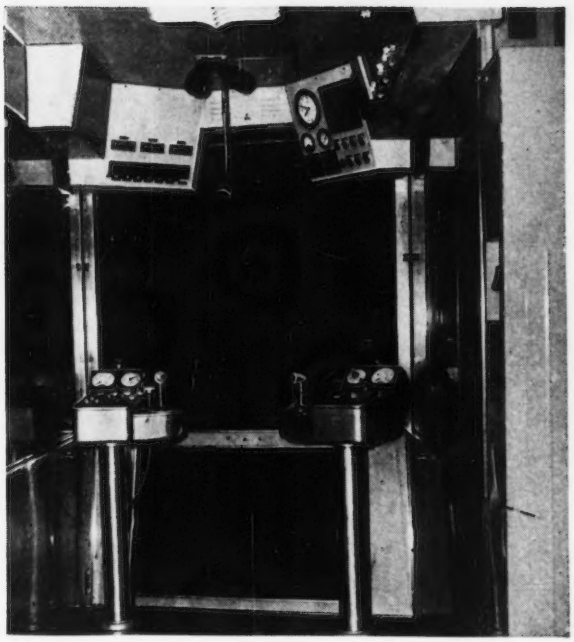
Particularly helpful, too, were I. M. C. men in the Phosphate Minerals division at Bartow, Fla. I. S. ("Cap") Tillotson, general mine superintendent at Bartow, sensed the possibilities immediately. He not only helped immensely with suggestions for improvements, but also gave every possible support to the study. George W. Moyers, vice president in charge of the Phosphate Minerals division, and Floyd Bowen, manager, Florida department, Phosphate Minerals division, saw clearly the value of improving the dragline operator's working space and wholeheartedly supported the development of the new cab and its equipment.

J. G. Ivy, electrical chief of I. M. C.'s central engineering staff, designed and developed the new electrical control systems. The controls themselves were built by W. F. and John Barnes & Co., Rockford, Ill. The General Body Corp., of Chicago, built the cab.

Operator visibility was secured easily by locating the cab far enough ahead and to one side of the main structure so that the bucket could be seen at all times.

Heavy plate glass windshields surround the operator (see photographs) and to make them a help rather than a hindrance they are equipped with windshield washers and heavy-duty bus-type windshield wipers.

Operator comfort was provided by insulating the cab



INSIDE cab shows details of layout. Cab is air-conditioned, quiet. Note airplane-like "stick-type" digging controls.

OUTSIDE cab shows windshield wipers (washers are provided, too), spotlight, two levers that control all digging action.

against noise and the weather, by providing a comfortable seat, by making the controls easy to handle, and by providing proper lighting, both inside and outside the cab.

The operator's chair was carefully designed to give the right kind of support just where it is needed. It can be shoved back out of the way on rails if the operator wants to stand for a while.

Moving the controls takes no more effort than flipping a switch. There is no more foot work. The cab is air-conditioned, clean, and quiet.

Improved control now centers in the two levers just in front of the operator at easy hand-height. The one on the right acts like the joy-stick in an airplane to swing the dragline to the right when it is tilted right, or to the left when tilted left. Pushed forward, the stick hoists the bucket; pulled back, it lowers the bucket.

These latter movements are contrary to the natural movement, which would be to expect lowering when the stick is pushed forward. The movement had to be reversed, however, to coordinate with the left-hand stick.

The left-hand stick drags the bucket back when pulled in, and causes the bucket to pay out when pushed forward.

To swing left and hoist, therefore, the operator simply moves his right hand left and forward, and his left hand straight forward. To swing right and lower, he moves his right hand to the right and back, and moves his left hand back when he's ready to drag the bucket.

That's all there is to it.

This simplicity is gained, of course, by dint of tremendous planning and engineering design effort to develop an electrical system that would give smooth stepless control, handling lots of power, over hundreds of thousands of make-and-break contacts, and not go to pieces.

Reliable information is supplied the operator through four dials, an indicator panel, and an inter-com system by which he can converse with the other men on the job. By pressing one of the several switches at his side, the operator can talk in a normal voice (no shouting!) with his oiler, with the pump man, the pit man, or the head office.

On a panel up to his right, there are several other indicators that, if lighted, say in so many words, that there is a man in the pit, or similar messages. All these, and others, appear in the sketch adjoining the photograph at the head of this article, or in the drawing opposite.

It's Like Flying

By this time, it should have become apparent to you that this dragline control cab has much in common with the cockpit of an airplane. There is good reason for that. Both operator and pilot have to act on certain information that can most accurately be given by instruments, not by the "seat-of-the-pants" type of control. Then they have to act on this information with speed and precision. With this new control system, a dragline operator can do that as easily and accurately as a pilot can bring a DC-7 onto a given course.

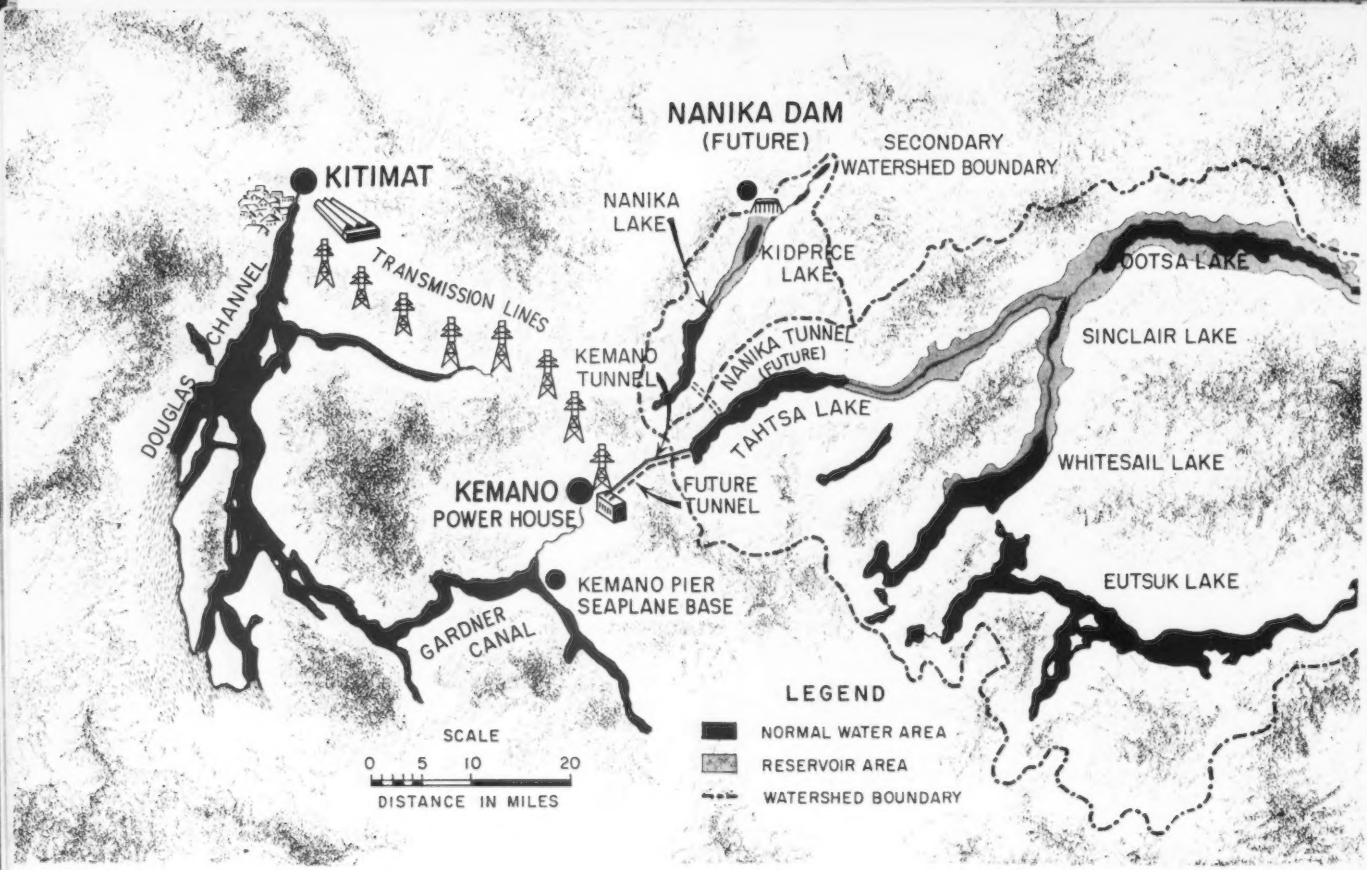
Will It Pay?

This new control cab has been directing the activities of I. M. C.'s dragline, "Tillie the Toiler" since Jan. 20, 1954. Its control methods may well become standard practice for such work, but it is too early to say just what results have been obtained. There is no question about the enthusiasm of most operators about the new cab.

The company's staff is cautious about predicting increased performance. It has high hopes, however, of getting a quite acceptable return on the investment. Dunlap and Associates' people point out that the technique used to develop this new cab can also be applied successfully and economically to smaller, less expensive, equipment.

Certainly here is a development for mining to watch. The principles of human engineering applied to making this dragline easier to operate can be applied as easily to any mining operation.

This cab is more, by far, than just a new way to run a dragline. The revolution that Tom Ware worked so long and so hard to bring about is a new approach to the whole business of mining. Alert management and engineering staffs will regard it as such.



As world's largest single integrated engineering feat, Project has altered the face of an area as large as Wales. Harnessed

Captured Canadian Power Feeds

JOHN H. KEARNEY
E&MJ News Editor

HIGH UP IN central British Columbia's Coast Mountains, in the lair of the legendary Thunderbird, Aluminum Company of Canada is building what eventually may be the world's largest aluminum smelter.

Alcan's British Columbia Project, a bold dream only a few years ago, soon will be an aluminum-producing reality. First stage, which will boast annual production capacity of 83,000 metric tons, will get underway this summer.

Latest word from Alcan indicates that commercial production will be underway in July.

When the third and final stage is completed, it will be capable of producing 500,000 metric tons annually. And it will have cost more than $500-million—all privately financed.

This is the third time in the 20th Century that the aluminum industry in Canada has moved into undeveloped areas to find favorable conditions for producing the "packaged-power" metal.

Canada's first aluminum smelter was established at Shawinigan Falls in 1900 on the forest-clad, unsettled banks of the St. Maurice River in the Province of Quebec.

A quarter of a century later, widening markets for aluminum and increasing demands for St. Maurice River power led the Canadian aluminum industry to the remote region of Quebec's Saguenay River valley system. This system today has been harnessed to an installed capacity of 2.5-million hp and serves what is presently the world's largest aluminum smelter—Alcan's Arvida plant.

Again pioneering, Alcan now has reclaimed another wilderness to help satisfy the world's increasing appetite for aluminum.

Altered Earth's Face

Alcan and its major contractors, Morrison-Knudsen, Kitimat Constructors Ltd. and Mannix Ltd. brought in $30-million worth of equipment and altered the face of an area as large as Wales.

They dammed a river and lake system, reversed the flow of the waters, drove a 10-mi tunnel through the heart of a mountain, conquered a mountain pass and brought beginnings of a city to a sprawling wilderness.

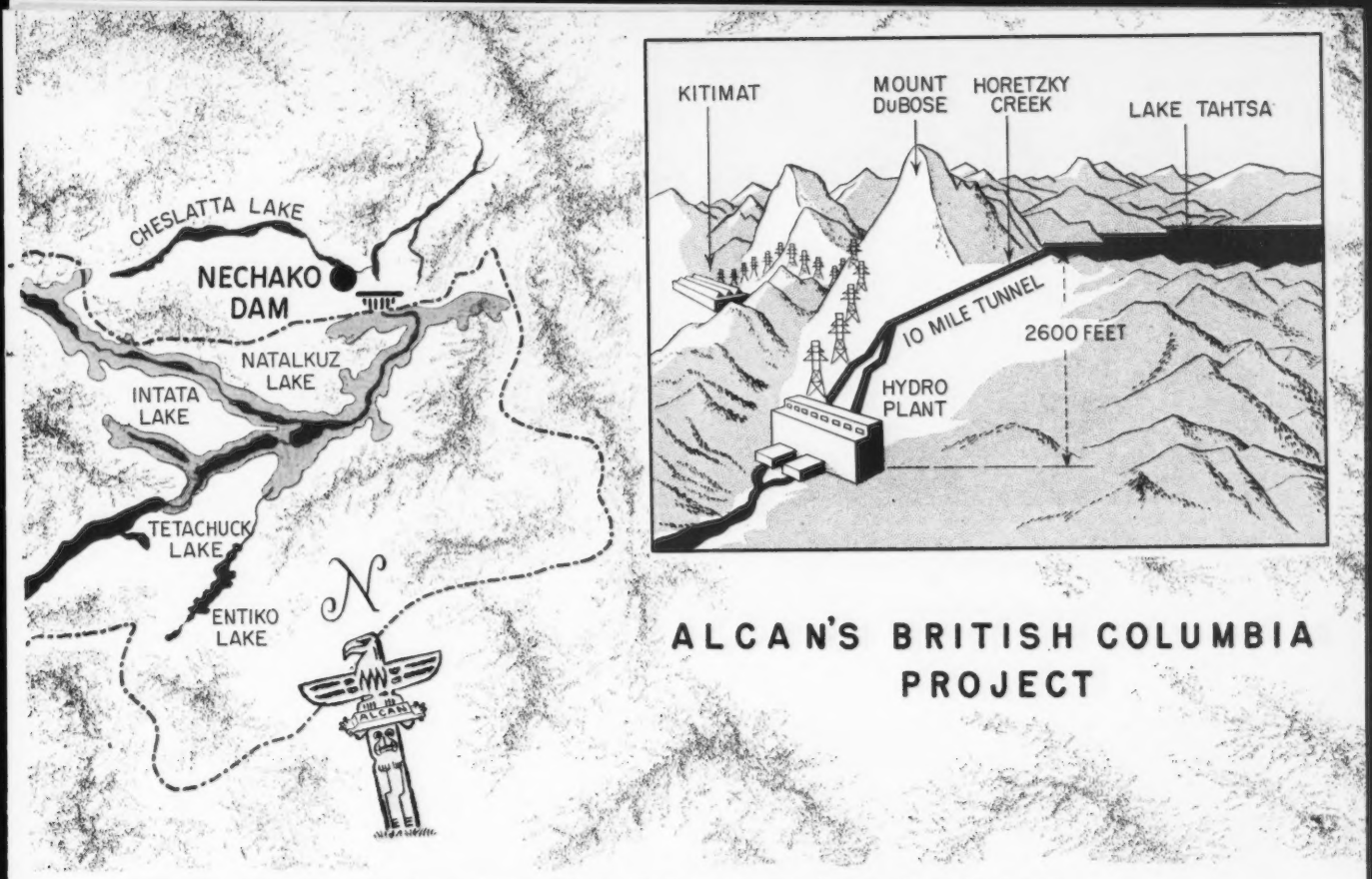
In the past three years, up to 9000 workers have transformed a mountain fastness into what may be the largest single integrated engineering feat in history.

As indicated above, this vast hydroelectric project is to be built in three stages. Ultimately it will have 2,240,000 hp installed capacity of which 1,600,000 hp will be firm. Rate of development of the second and third stages will hinge on market demand for aluminum.

First stage will boast 450,000 installed hp and will have an annual production capacity of 83,000 metric tons. It has cost more than $250-million.

This first stage embraces the smelter at Kitimat, an underground powerhouse at Kemano and a mountain reservoir—all giants.

Why was British Columbia, thousands of miles away from Alcan's Jamaica bauxite sources, chosen by



waters will provide power for the smelter at Kitimat which one day may become the world's largest.

Giant New Source of Aluminum

Alcan as a site for an aluminum smelter? The answer is simply that of British Columbia's 11-million potential of hydro-electric power, only one-tenth had been harnessed.

Land of Totem Poles

Specific site finally selected is 450 mi north of Vancouver in an area inhabited only by a few widely-scattered Indian fishing villages. In this land of the totem poles, heavy rains and snow feed rivers and lakes which line a rugged plateau.

In the area chosen, waters flowed eastward pouring through the Nechako Canyon into the Nechako River (see map), a tributary of the Fraser River. Only at the western end of the watershed, at Kemano, could advantage be taken of the half-mile drop to sea level. The smelter then could be erected on the sufficiently flat building space offered by the delta at Kitimat. At Kitimat, the smelter would be close to sea lanes and not too far from the Kemano powerhouse.

By damming the Nechako River, the waters could be sealed into a 125-mi long river and lake system draining a watershed of 5,475 sq mi. These waters then could be tapped by piercing the mountain wall at the western end of Tahtsa Lake (see map).

A tunnel driven through this mountain wall would link the reservoir with a powerhouse which would be built inside the mountain at its base. This mountain, a 7000-ft peak, has since been named Mount DuBose, after McNeely DuBose, the engineer who guided much of Alcan's Arvida project and has been credited with fostering the B. C. Project.

From the powerhouse inside DuBose Mountain, transmission line cable could carry the electric power across Kildala Pass 48 mi to the smelter on the Kitimat delta.

Such was the plan. It has now been largely executed. And in that execution, Alcan has built a lasting industrial monument to itself and a new source of aluminum for the free world.

Decision was made to plug the Nechako Canyon. Morrison-Knudsen subcontracted the building of the dam to Mannix, Ltd. of Calgary. The dam was constructed in such a way that experts say that its life will be measured in geological rather than historical time.

The dam was begun in April 1951 and completed in December 1952 at a cost of $20-million. At the outset, to obtain fill, a quarry rock face was blasted by the biggest shot of dynamite ever used in Canada. In this explosion, 200 tons of dynamite scattered rocks weighing up to 20 tons.

Third Highest Dam

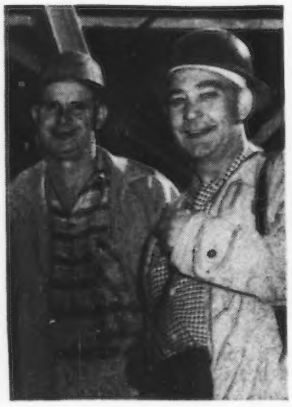
Now staying the flow of a chain of twelve lakes, the dam is the third highest rock-fill dam in the world. It has a crest length of 1550 ft with sloping flanks rising 317 ft to a 40-ft wide strip at the crown. As a gesture to the excellent government cooperation received, Alcan has named the structure Kenney Dam after E. T. Kenney, then Minister of Lands and Forests.

Meanwhile, excavation for the powerhouse and the tunnels proceeded apace. This underground excavation was a job for "hard rock" men. And it was here that miners made their

These Men Made Alcan Command Decisions . . .

N. V. Davis (l), Aluminium Limited pres., and **R. E. Powell** (r), Alcan pres., discuss plans with **McNeely DuBose.**

P. E. Radley (1), B. C. Project manager for Alcan, explains blueprint to Vancouver visitor, *E&MJ* News Editor **Kearney.**



Ole Strandberg (l), M-K Project mgr., and **Frank Matthias,** Alcan asst. Project mgr.

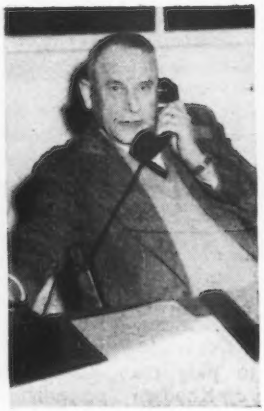
R. E. Davis (1), tunnel excavation supt., and **C. W. Abrahamson,** Alcan asst. res. eng.

W. H. Sparks (1), Alcan asst. res. eng., and **G. T. Malby,** Alcan res. eng. at Kitimat.

Bernard Robinson, Kitamaat Indian chief, is a timekeeper.

. . . These Men Helped Carry Out Those Decisions

E. W. McKernan, superintendent of power generation at the Kemano works.



H. M. Whiting, Project manager, Kitimat Constructors, Ltd. (recently retired).

Karl Roestad, resident engineer in charge of Alcan operations at Kemano.

A. C. Turney (1), Kitimat Works mgr., and **J. G. Campbell,** production supt., Kitimat Works.

greatest contributions to the Project.

Altogether, more than 1000 miners drilled, blasted and mucked 1,564,000 cu yd or nearly 3.5-million tons of rock.

Oldest rocks in which the miners worked probably belong to the Hazelton group of Jurassic age and are separable into two divisions: a bedded complex of greenstone, schist, quartzite and amphibolite; also, an unbedded complex of diorite and greenstone. This unbedded complex is intruded in one area by a coarse pink granite which itself is shot through by trap dikes.

All the aforementioned rocks are intruded by a narrow, easterly-trending tongue of Coast Range intrusives. These intrusives consist of medium to coarse-grained granodiorite and quartz diorite, with hornblende and/or biotite as the main mafic minerals.

The granodiorites are faulted in several places and are cut by many dikes of pegmatite, aplite, lamprophyre and trap. Along these faults and numerous sets of joints, alteration and oxidation has occurred.

B. C. Project Facts Sheet

FIRST STAGE:
Annual capacity ..... 83,000 metric tons
One 10-mi tunnel, one vertical penstock (second penstock drilled but unlined), three turbine-generator units, two potlines.
Cost, more than $250-million.

SECOND STAGE:
Annual capacity ..... 248,000 metric tons
Line second vertical penstock, add five turbine-generator units, add four potlines.
Estimated cumulative cost, $450-million.

THIRD STAGE:
Annual capacity ..... 500,000 metric tons
Drill second 10-mi tunnel, drill two more vertical penstocks, drill 3-mi tunnel connecting Nanika and Kidprice Lakes with Lake Tahtsa, drill second trailrace, add eight turbine-generator units, add six more potlines, lengthen powerhouse 400 ft.
Estimated cumulative cost, more than $500-million.

PROJECT IS NOTABLE FOR:
Third highest rockfill dam in the world;
One of the world's largest storage reservoirs;
World's largest underground powerhouse;
Highest-capacity multinozzle vertical impulse turbines;
First 300-kv cables in North America;
Largest power development ever undertaken by private enterprise;
World's largest steel-reinforced aluminum-cable conductors;
Building of Kenney Dam occasioned the biggest blast of dynamite ever shot in Canada;
Difficulties of supply gave rise to the largest private helicopter operation in history.

Ten-Mile Tunnel

Through this rock, from the Tahtsa intake toward the powerhouse at Kemano, the miners drove a 10-mi tunnel, horseshoe-shaped in section and 25-ft in diameter.

This main tunnel terminates 2600 ft up the side of Mount DuBose, after which it divides into two penstocks. The main tunnel was driven in four headings. In addition to a heading at the 2600-ft level (on the Kemano or powerhouse end), driving upward toward the Tahtsa intake, and a second heading, at Tahtsa, driving downward toward the powerhouse, two other headings were established at an intermediate point, Horetzky Creek.

Horetzky Creek, a tributary of Kemano River, flowed through a deep gorge high up the side of Mount DuBose. This offered an opportunity to tap into the side of Mount DuBose to reach the main tunnel line. In fact, this opportunity influenced the location of the tunnel.

A construction adit 1700 ft long was driven into the mountain at Horetzky Creek. Stemming off this adit, two additional headings were developed: one working upward toward the Tahtsa intake; the other downward toward the 2600 ft level.

Work on the Project began in February 1951. Target date for placing the Kitimat smelter in operation was mid-1954. So the driving of the tunnel was a race against time.

In February 1953, only half the tunnel had been driven. The miners had to cut half a mile a month to finish in time. They made it, finally holing through last Dec. 2. In doing so, they broke world's records three times.

Miners' World Record

One record, of which the miners are particularly proud was set in the week of Feb. 16-21, 1953. During those six days, miners drove 282 ft of 25 ft bore in diorite granite on one heading, an average of 47 ft daily. Included in that total was a 24-hr record of 61 ft.

General procedure for driving the tunnel was similar at all four headings. Conway muckers (100 hp) were used to load. Combination battery and electric trolley locomotive-drawn trains of 6 cu yd (with sides built up for 7 cu yd) Granby & Western mine cars were used to haul muck out over a 36-in.-gage 60 lb railtrack in each heading.

At all headings, five cars was considered a normal trainload. Drilling was done from built-up steel jumbos traveling on rails. These jumbos carried a car-changer or "cherry-picker" to feed empty cars ahead of the train to the mucking machine.

All the main tunnel headings were driven full face. Three of the four main headings were drilled with 3½-in. Ingersoll-Rand DA35 drifter drills on 48-in. sliding cone aluminum power-feed shells, permitting use of 4-ft steel changes.

Steel Jumbo Used

At each of these three headings a steel jumbo, with three working decks, had vertical columns, arms and standard-type dump and swing equipment on which 12 drifter drills usually were mounted.

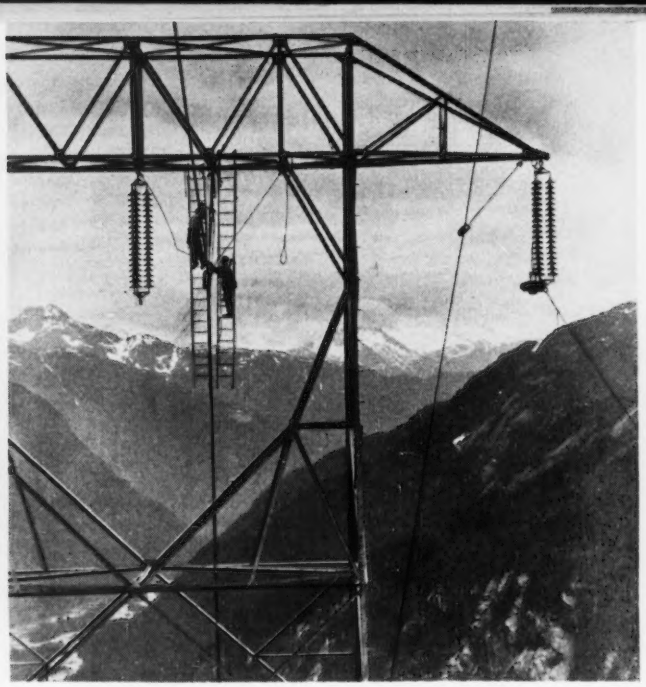
Top deck of each jumbo also carried DA35 drifters mounted on jib-type booms. Drilling patterns were varied to fit character of the rock. Bits used were 4-wing 2-in. Carset detachable bits with tungsten carbide inserts. Also, a few Gardner-Denver drills were used.

In the main tunnel, 102-108 holes usually were driven into the heading 11-13 ft. This resulted in an advance of 10-12 ft per round blasted. Where rock was weak, the rounds were shortened and steel supports were erected close to the heading.

All drills were powered by compressed air piped from a central diesel or electric powered plant at each heading, giving about 100 psi. About 4000

At Kitimat . . .

The pots are now being baked in preparation for the signal this summer to go on-stream.



At Kildala . . .

Stringing transmission cable over the mountain pass demanded courage in men, boldness in design.

cfm were required for drills and accessory equipment for each heading.

The fourth heading, downward from the Tahtsa intake, was driven by Swedish-type Copco drills with "Coromant" chisel-type bits. These bits have a tungsten carbide insert permanently set in the end of a ⅞-in. diameter drill rod. Drill jumbo for these drills had working decks from which the air-leg drills operated.

In most cases, blasting was by electric delay detonators, exploding 1¼-in. by 8-in. 40% Giant gelatin dynamite.

After blasting, ventilation was provided at each heading by 13,000 cfm Sutorbilt heavy duty 22x60-in. reversible fans, operating with a 24-in. diameter vent pipe.

53,000 Feet Total

A total of 53,000 ft was driven for the main tunnel. Each foot of tunnel advance brought out 21 cu yd of rock, solid measure. Thus, an average 10-ft round necessitated loading out 210 cu. yd, or 40-50 car loads.

Ten miles from the Tahtsa intake, the tunnel divides into two penstocks, at which point the water begins a 2600-ft descent, a drop more than 16 times the height of Niagara Falls.

To contain the tremendous pressure developed by the water in its flowing descent—1000 psi at the bottom—these penstocks have to be lined with concrete backing up armor-plate steel. Sections of this armor-plate, 16 ft long, were lowered on rails from the 2600-ft level and from another adit established at the 1600-ft level. Once in place, the sections were welded together. For the first stage, only one penstock was lined.

Inside diameter of the penstocks is 11 ft but the penstock tunnels were excavated up to 15 ft. At the lower end, each penstock divides into four conduits. All eight conduits feed into a valve chamber which houses a 51-in. spherical valve for each conduit. Also excavated out of rock, this valve chamber is 35 ft high, 20 ft wide and 465 ft long.

Through these conduits, the water feeds into gigantic turbine-generator units. From each turbine-generator unit, the water will be discharged into a tailrace branch, the eight branches converging into one discharge tunnel (27 ft in diameter, 40 ft high).

The powerhouse itself is an enormous rock chamber. Some 1400 ft inside the base of Mount DuBose, the chamber is 80 ft wide, 120 ft high and 700 ft long. Blasting clearance was left for future extension of the chamber which will usher in the third and final stage.

Largest Impulse Turbines

In this mammoth B. C. Project, Alcan installed the largest multi-nozzle impulse turbines in the world. For the first stage of development, Alcan is using only three turbine-generator units. Each turbine has a guaranteed maximum output of 140,000 hp and an expected maximum ouput of 150,000 hp. Turbines were manufactured, one each, by Canadian Allis-Chalmers, Vancouver Engineering Works and Dominion Engineering of Montreal.

Generators, each with an output of 106,000 kva, were manufactured, one each, by Canadian General Electric, Canadian Westinghouse and the English Electric Co. Ferranti Ltd. supplied some of the transformers.

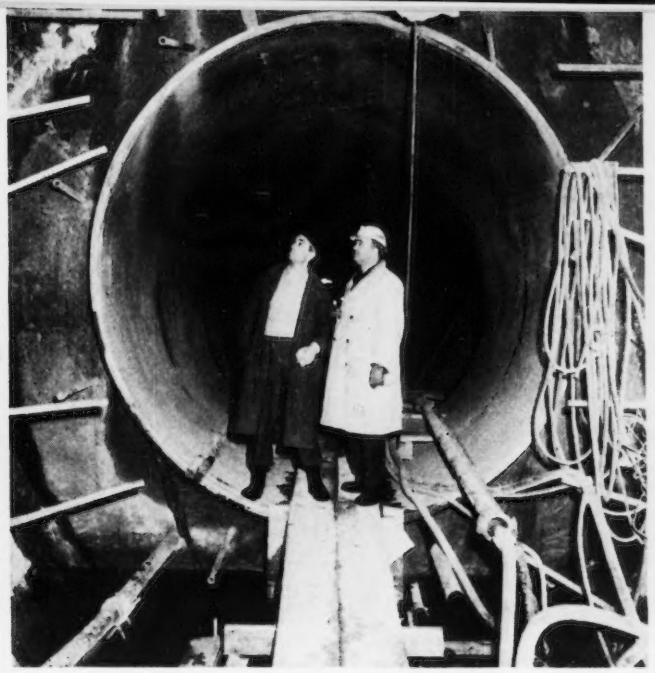
High-voltage oil-insulated cables to carry high tension power from the powerhouse at Kemano to the switch station just outside were made by Canada Wire and Cable Co. and Pirelli General Cable Works Ltd.

Alcan is now putting the finishing touches on powerhouse installations. The three turbine-generator units in the first stage will produce a total of 450,000 hp.

From the switch station at Kemano, the power is carried 48 mi to the smelter at Kitimat. The transmission line was strung through a series of valleys and up over Kildala Pass at 5300 ft elevation—a formidable operation.

Wild West Story

Black fumes billowing skyward when workmen first began lining the pots with carbon led a local Indian with a wry sense of humor to remark to A. C. Turney, Kitimat works manager, that his "smoke signal" was coming through all right.



At Kemano . . .

Kearney (left) and **Roestad,** both 6-footers, examine penstock linings shortly before linings were completed.

At Kenney Dam . .

Heavy rockfill and fines were flushed by workmen operating high-pressure monitors.

To withstand icing loads in the Kildala mountain pass and transmit power up to 300,000 v, Alcan used ACSR (aluminum cable, steel reinforced) This cable—2.26-in. in diameter—the largest such cable ever built, was manufactured by Alcan at Shawinigan Falls.

Conquering of Kildala

How Kildala Pass was conquered is a saga of toughness in machinery and courage in men.

Both Alcan and Morrison-Knudsen pay particular tribute to the courage of Albert Charron, who by his daring saved weeks of valuable time and untold manhours of back-breaking labor.

In mid-May 1952, Morrison-Knudsen men faced perhaps the most difficult phase of the entire B. C. Project—the building of the transmission line access road over forbidding Kildala Pass.

Already, in six snow-filled months, the road had been driven part way. Only six miles separated the men from the summit but the relatively short distance belied the magnitude of the obstacles. The six-mile stretch of road would have grades from 15-25%, rising about 1000 ft a mile!

By ordinary methods this meant blasting miles of switchbacks through solid granite. Added to this was the worry of snowslides and avalanches which would accompany the spring thaws.

If only heavy road equipment could be dropped on top of the pass, the work could be advanced weeks ahead of schedule. Working from the top, the access road could be pushed down both ways.

Was it possible to open a road up the steep hard-packed snow on the other side of the canyon? At the cayon trough, snow was 150 ft deep but what was it like farther up?

If a tractor could make it, other machines could follow. But Morrison-Knudsen officials could hardly order a man to so risk his life. Charron volunteered.

In an International TD-24 crawler tractor, Charron picked his hazardous course, understandably making slow progress. Stopping only to eat and to sleep in a specially-designed sleeping bag, Charron covered about a mile a day.

At one point, Charron crossed a snow bridge under which rushed torrents of icy water. Just as his fuel was nearly exhausted, he reached a projected camp site. Charron quickly leveled a helicopter landing area and radioed for supplies. The summit of Kildala, however, still towered above him.

Charron continued for five more grueling days. Once, his tractor slid backwards 400 ft. Then, after repeated attempts, backing and forging ahead again, Charron reached the narrow defile and level ground. Kildala had been conquered!

With the aid of Charron's tractor, another International TD-24 was brought up. The two bulldozers quickly cleared the area of snow. A camp was established. Helicopters flew in supplies. And sections of the road were started immediately.

Kitimat As Smelter Site

Kitimat had many things to recommend it as a smelter site. Located on tidewater, the harbor is suitable for heavy shipping throughout the year. Kitimat's delta offered sufficient space for the smelter plant and for location of other industries which most certainly will be lured by the abundance of electric power. Another advantage is Kitimat's proximity to the town of Terrace, B. C., which lies on Canadian National Railway's transcontinental line. CNR is now constructing a spur-line linking Terrace and Kitimat. Finally, there is enough land in the Kitimat area suitable for a city.

For the smelter and auxiliary construction at Kitimat, eight British Columbia firms united to form Kitimat Constructors Ltd. Pooling resources were Dawson Wade & Co. Ltd., Marwell Construction Co. Ltd., Campbell-

To Sum It Up

During a shop-talk session one evening, Karl Roestad, Alcan resident engineer at Kemano, commented to visiting *E&MJ* News Editor Jack Kearney: "Whatever else you say about this Project, it's one 'helluva' big job."

Unusual Problems . . .

Aerial tramway 5500-ft long with a 9-ton cable car supplied the 2600-level camp, ½-mi up Mt. DuBose.

Okanagan Helicopters Ltd.'s whirlybirds using postage-stamp landing areas supplied Kildala workmen.

Bennett Ltd., Bennett & White Construction Co., General Construction Co. Ltd., B. C. Bridge & Dredging Co. Ltd., Dawson & Hall Ltd. and Emil Anderson Construction Co. Ltd. In addition, the firm of Evans, Coleman & Evans Ltd. supplied practically all cement used at Kenney Dam, Kemano, Kildala and Kitimat. In 1953 alone, the B. C. Project used 270,000 barrels of cement.

The smelter itself at Kitimat may one day be the world's largest. This, of course, hinges on development of the third stage. For this first stage, two potlines have been built, each 1000 ft long, housed in six buildings.

Söderburg Process

While Alcan would not release many details of its reduction process, it is known that the Söderburg process will be used with sunken pots. Each pot weighs 8-tons and measures 32 ft long, 11 ft wide and 3½ ft deep. They were made by the American Pipe & Construction Co. A total of 346 pots were shipped via barge from Vancouver to Kitimat for operation of the first phase.

The step-down transformer banks are single-phase OFW-type transformers rated at 37,000 kva, with a voltage ratio of 275/13.2 kv, with four 2.5% taps, the neutral being solidly grounded. Banks were manufactured, one each, by Canadian General Electric, Canadian Westinghouse and Ferranti Ltd.

Potlines will be supplied by eight mercury-arc rectifier units, of the ignitron type in the initial establishment, each rated at 12,500 kw. These units comprise:

1. A single-tank 1200-amp 1-million-kva interrupting capacity outdoor oil circuit breaker;
2. A self-cooled phase-shifting transformer rated at 13,200 kva, to give 48-phase operation overall;
3. A self-cooled rectifier transformer rated at 13,200 kva, with a 3-phase primary and two 6-circuit wye-connected secondary windings.

These 12 windings supply the 24 anodes of two rectifier frames, each consisting of 12 pumped ignitron-type water-cooled rectifiers with auxiliaries. The cathodes of the 16 frames are connected through high-speed air circuit breakers to the positive main dc bus.

Neutral points of all secondary windings are connected to the negative dc bus, through interphase transformers.

Rectifier equipment is expected to have an efficiency of more than 96% from the 13.2-kv ac bus to the 1000v dc bus.

High-voltage circuit-breakers and disconnects are similar to those used at Kemano. Outdoor low-voltage disconnects are rated at 6000 amp for main connections, and 1200 amp in rectifier connections.

The step-down transformer banks are protected on primary and secondary sides by induction-type phase and neutral over-current relays. Individual transformers are equipped with gas-detector relays.

Alarm devices are used for oil and water lines and for winding temperature detectors. The rectifier transformers are protected by primary phase and neutral relays, gas-detector relays, high-temperature and low-oil-level alarms. Rectifier units are equipped with loss-of-vacuum, reverse-current, and over-temperature protection.

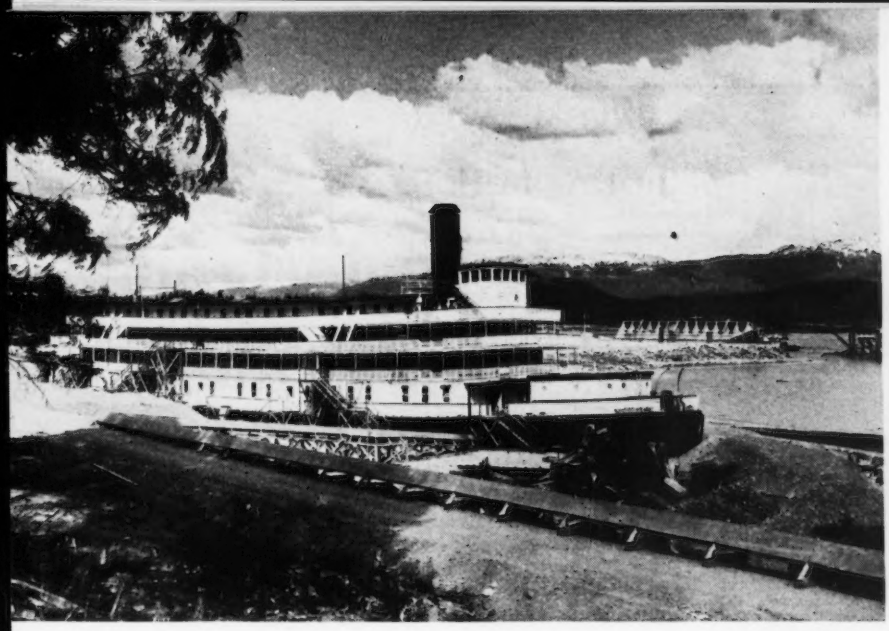
Lining the Pots

Lining of the pots began last November. To start off production, natural cryolite will be used. Later synthetic cryolite will be made from recaptured fluorine. Fluorspar will be obtained from Newfoundland Fluorspar Ltd. which, like Alcan, is a subsidiary of Aluminium, Limited, Montreal. Fluorspar will be refined at Arvida then shipped as aluminum fluoride to Kitimat. Petroleum coke will be brought from California and possibly Alberta.

Second stage will involve addition of four more potlines at Kitimat and five more turbine-generator units in the powerhouse at Kemano. The added units would boost overall installed capacity to 1,120,000 hp. Annual smelter output would be increased from 83,000 metric tons to 248,000 metric tons. Ushering in the second stage will

Of Men and Machines

Construction at the B. C. Project required writing a new chapter on toughness in machinery. One Kitimat official, thinking aloud, said, "I can't imagine what life was like 'B–E'." A companion queried, "Before electricity?" "No," the official responded, "Before Euclids!"



. . . Brought Unusual Solutions

Some 300 workers were housed in this Sacramento sternwheeler, Delta King, towed ashore at Kitimat.

be relatively simple and fast since the powerhouse cavern already is large enough to accommodate the five additional power units and the existing main tunnel and water storage would be adequate. The second penstock already is drilled and would require only lining.

Third Stage Development

The third stage, however, will involve additional tunneling and excavation. A second 10-mi tunnel will have to be bored. The powerhouse will have to be extended another 400 ft making an overall length of 1100 ft. Eight more turbine-generator units will have to be added, giving the Kemano powerhouse a total capacity of 2,240,000 hp, of which 1,600,000 will be firm throughout the year. The watershed will have to be expanded to include Nanika and Kidprice Lakes (see map); this would be a relatively minor undertaking since the Kenney Dam already impounds a good percentage of the water needed even for this third stage. And finally, the third stage would dictate the addition of six more potlines at Kitimat, boosting annual capacity to the intended maximum of 500,000 metric tons.

Paralleling the British Columbia Project construction has been the development of Alumina Jamaica Ltd., another subsidiary of Aluminium, Limited. This plant is the first alumina plant in the Caribbean area.

Established near Mandeville, Jamaica, it is now producing 450 metric tons of alumina daily. Heretofore, the fine white powder has been shipped to Norway. Now, however, it is beginning to feed the insatiable appetite of the Kitimat smelter.

A deep sea port with a 600-ft steel and concrete pier is being completed at Old Harbour Bay, 22 mi west of Kingston.

The alumina will be moved over a 35-mi railway to the new dock at Port Esquivel on Jamaica's south coast.

From the cars, it will be unloaded into storage tanks and discharged by a 1400-ft conveyor to the pier. By shipping alumina instead of bauxite over the 4500-mi sea route from Jamaica to Kitimat, a transportation saving of more than 50% will be achieved.

The New Cook & the Flapjack Flipper

Wildlife abounds in the uncharted regions of British Columbia now reclaimed by Alcan. Seals frolic in nearby waters. Last summer a whale made Kitimat harbor a playground. Salmon which weigh under 10 lb are thrown back.

Moose, caribou and grizzlies occasionally are seen and black bears have become pets in camp. Oldtimers tell about one young bear called Junior who became a regular visitor at breakfast time. Cooks often would toss flapjacks which Junior would catch with the ease of a major league outfielder. One day, a new cook tossed him a flapjack and then had to duck. Junior looked at the tidbit a moment and then flung it back. The new cook had forgotten the molasses!

For smelter workers and their families, a model-community plan has been devised for the city of Kitimat. Alcan is determined that Kitimat will not be a "company town."

In September 1952, Clarence S. Stein, town planner and housing consultant, was engaged by Alcan to direct and coordinate the work of experts in blue-printing the future city. Physical aspects and preparation of the master plan itself were assigned to Mayer & Whittlesey, and their associate, Milton Glass.

Some 500 dwellings will have been built before summer's end. About 6-7000 persons, including workers and their families, will be in residence at Kitimat for the first stage of production. And the town will grow as the expanding smelter requires more workers and as outside businesses and industries are attracted.

What only a few years ago was a wilderness adjacent to the Kitamaat Indian village of 300 inhabitants, holds promise of being British Columbia's 4th or 5th largest city in some not-too-distant tomorrow. Alcan officials envisage a city of 35,000- to 50,000, depending on industrial growth.

Alcan Production

Exclusive of ACSR, Alcan is producing aluminum at the annual rate of 494,000 metric tons, of which 40% is exported to the United States. When Kitimat's full potential is developed, it will more than double Canadian aluminum production.

Despite a United States import duty of 1½c a lb, Alcan is able to market its ingot in this country at competitive prices.

Second biggest consumer of Alcan ingots is the United Kingdom, which takes 30-35% of Alcan production. Domestic Canadian consumption amounts to about 20%. Remainder is spread thinly over some 64 nations.

United States aluminum industry in 1953 produced 1,252,015 tons, an increase of 33% over the previous record year of 1952 when output reached 937,331 tons. Biggest United States producers are the Aluminum Company of America, Reynolds Metals Co. and Kaiser Aluminum & Chemical Corp.

Is there a danger of oversupply? This is important to Kitimat since development of the second and third stages hinge on world demand.

Alcan does not think so. Neither do the United States' Big Three who in the past three years have invested close to $800-million in new facilities, most of that amount to increase productive capacity. And a fourth U. S. producer, Anaconda Aluminum Co., plans to bring its first plant, at Columbia Falls, Mont., into production this year.

GERALD MOORHEAD
General Manager
Silvermines Lead & Zinc Co., Ltd.
County Tipperary, Ireland

Just As In U. S. . . .

Ireland's Lead, Await Favorable

LIKE THEIR COUNTERPARTS in the United States, many lead and zinc miners in Ireland have been forced by low prices to either stockpile output or suspend production altogether.

Nevertheless, Ireland's lead-zinc industry, which received a shot-in-the-arm a few years ago, is laying future plans and is poised to resume production when market conditions improve.

Immediately prior to and during the boom in base metal prices, 1948-52, attention was directed to lead and zinc deposits in Ireland, many of which had been abandoned for close on 100 years.

Prospecting was carried out in Counties Clare, Cork, Donegal, Fermanagh, Galway, Kilkenny, Monahan, Sligo, Tipperary, Wexford and Wicklow. As a result, the following three properties reached the production stage:

Abbeytown Mining Co., Ltd., a subsidiary of Johannesburg Consolidated Investment Co., Ltd., operating at Ballysodare, County Sligo. Galena and sphalerite is found in a dolomitic carboniferous limestone. Ore is won at the rate of 300 tons per day, mainly by open pit methods and is treated by differential flotation. After filtration, the concentrates are shipped from Sligo to the smelters.

Wicklow Mining Co., Ltd., operating at Glendalough, County Wicklow. Galena and sphalerite occurs in quartz veins in granite. The ore is worked from adits and mining is at a rate of 50 tons per day. Concentrates are produced by tabling and jiggling. Sphalerite is not being recovered and the middlings are being stockpiled for re-treatment in the event of an increase in the market price of zinc.

Silvermines Lead & Zinc Co., Ltd., a brief outline of whose operations is given hereunder:

Silvermines' properties extend for a distance of 3 mi along the lower slopes of the Silvermines Mountains, an east-west range, the center of which is approximately 20 mi north-east of the city of Limerick and 5 mi south of the town of Nenagh in County Tipperary. Sufficient information was obtained concerning the extent of two deposits within the area of Silvermines' properties to warrant the erection of two small plants in which metallurgical problems and methods of treatment could be studied:

(a) A calamine deposit, containing both zinc carbonates and silicates;

(b) A lead sulphide deposit.

Calamine Deposit

The calamine occurs as a replacement in dolomitic limestone. Reports of earlier examinations stated the proved ore at 500,000 tons containing 21.4% Zn and indicated ore at 2,250,000 tons containing 12.3% Zn. In addition, there was 14,870 tons of dump ore averaging 15.2% Zn.

Grade and extent of ore encouraged the company to devote much of its attention to the exploitation of the zinc deposit and by the end of 1950, the installation and erection of a pilot Waelz plant, including an 87 ft long x 6 ft diameter rotary kiln, intensive-filter, baghouse and ancillary equipment for the treatment of the calamine was completed.

The capacity of the kiln was 40 tons of ore per day and the product, which was Waelz zinc oxide in powder form, assayed up to 65% Zn and 8% Pb.

In order to up-grade the product to pigment oxide the erection of a Wetherill plant to the design of Messrs. Krupp of Germany was put in hand. Before the erection of the plant was completed, the decline in the price of zinc metal forced the suspension of operations in October 1952.

Prior to closing down and on the basis of the results obtained, the erection of a kiln with a capacity of 200 tons per day was recommended by the company's technical adviser on the Waelz Process and it was maintained that there would be an all around improvement in results with the larger unit. The recommendation included adaptation

Can E&MJ readers help with this?

"It would be of great interest to the Silvermines Lead & Zinc Co., Ltd., to know if any of the lead or lead-zinc mines in the United States are recovering barytes as a by-product. And if so, the method employed and the grade of the product."—Gerald Moorhead

Zinc Miners Market Prices

of the 87 ft x 6 ft kiln and baghouse for the sintering or nodulizing of the product (Waelz oxide) from the larger kiln, the recovery of lead oxide and the final treatment of the sintered Waelz oxide in the Wetherill plant for the production of the higher grade zinc oxides. However, it was decided that such an expansion at current prices would not be justified.

Lead Sulphide Deposit

The lead sulphide deposit consists of a series of narrow vertical veins, 1 in. to 6 in. wide, containing argentiferous galena, barytes and calcite occurring in a flat dipping (24 deg) Devonian sandstone. The sandstone lies unconformably on Silurian slates and shales.

Thickness of the sandstone has been determined at only one point where the total thickness including six intercalated shale beds is 220 ft. Generally, the shale beds are under 1 ft, but approximately midway in the sandstone there is a green shale with a thickness of 15 ft.

Extent to which the mineralization occurs in the lower portion of the sandstone and in the Silurian has yet to be determined.

Early operations were confined to an upper section of the sandstone 35 ft thick occuring between two shale bands which cut off the mineralization. Subsequent mining and diamond drilling has proved the increased thickness mentioned above.

Where there was a reasonable density of vertical veins, the whole block of ore was stoped out by a system of underhand bench stoping, the broken ore being scraped back to a box hole or chute. Type S.2A Pikrose electric scraper hoists, 25/45 hp and Holman 15 hp E. J. double drum scrapers were used for this purpose.

On the hanging wall of the sandstone there is a carbonaceous shale which forms a bad roof as it tends to scale off. However, the sandstone stands well and, if mining is stopped about 2 ft below the hanging wall shales, no difficulties are experienced from roof caving. Stopes are up to 35 ft high and the largest is 200 ft long with pillars at approximately 35 ft intervals.

In planning for future production three systems are being considered:

Open pit mining in the section where the orebody outcrops or where the orebody is at suitably shallow depths.

Shrinkage stoping is being considered for sections where the depth of the orebody below the surface requires underground mining. Where the density of vertical veins warrants it, the ore would be stoped in panels approximately 35 ft wide and would be extracted by a scraper hoist through a slusher drift, with staggered openings into the stope above and with one box hole into the tramming drift below.

Sub-level stoping as an alternative to shrinkage stoping.

The grade of deposit is 2.25% Pb and 1 oz Ag per ton of ore. When the company was formed, the proved and indicated ore reserves amounted to 320,000 long tons.

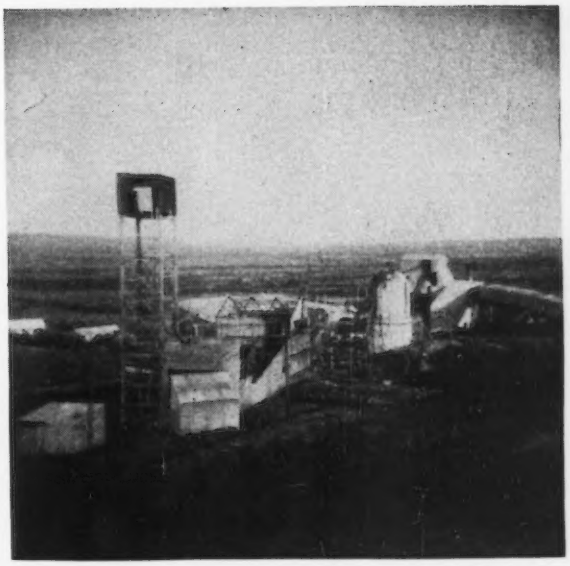
A small mill to treat the ore by flotation was erected. In its early operations, difficulties were experienced on the recovery of lead oxide which formed a considerable proportion of the total lead in the dump ore.

However, as more ore was won from underground, the quantity of oxide lead decreased and the operating results (see table) showed a steady improvement over the years. Immediately prior to the suspension of production in April 1953, the mill throughput was steady at 200 tons per day.

Laboratory tests were carried out on the recovery of the barytes by gravity concentration and by flotation. However, no simple straightforward system for the production of a marketable grade barytes concentrates was found and further attention is still being given to this problem.

Prior to the suspension of production, a program for increasing the throughput to 400 tons per day was put in hand. It included diamond drilling in order to increase the ore reserves and this was successful in that the proved ore reserves were increased to over 500,000 long tons with an average grade of 2.11% Pb and in addition, approximately 1-million long tons of partly proved and indicated ore.

Plant installation for the increased throughput is now well advanced, but in view of the current trend of the metal markets, a further expansion by the introduction of a Heavy Media Separation plant into the circuit is now being contemplated. Preliminary tests on the ore have indicated its amenability for this treatment.

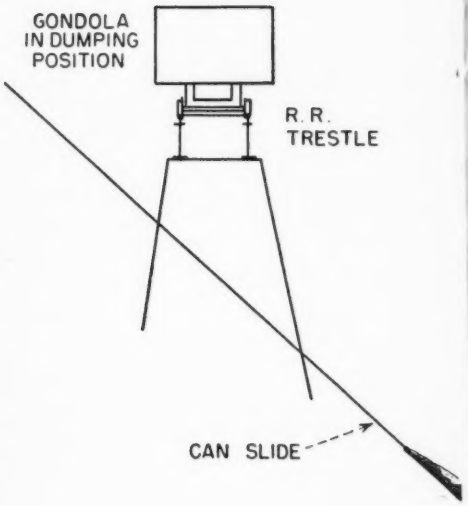


New construction at Silvermines' Shallee Lead Mine includes headgear at top of a 160-ft deep shaft and 315 cu yd steel silo. A 60 hp automatic electric direct-pull hoist is located at the top of the headgear.

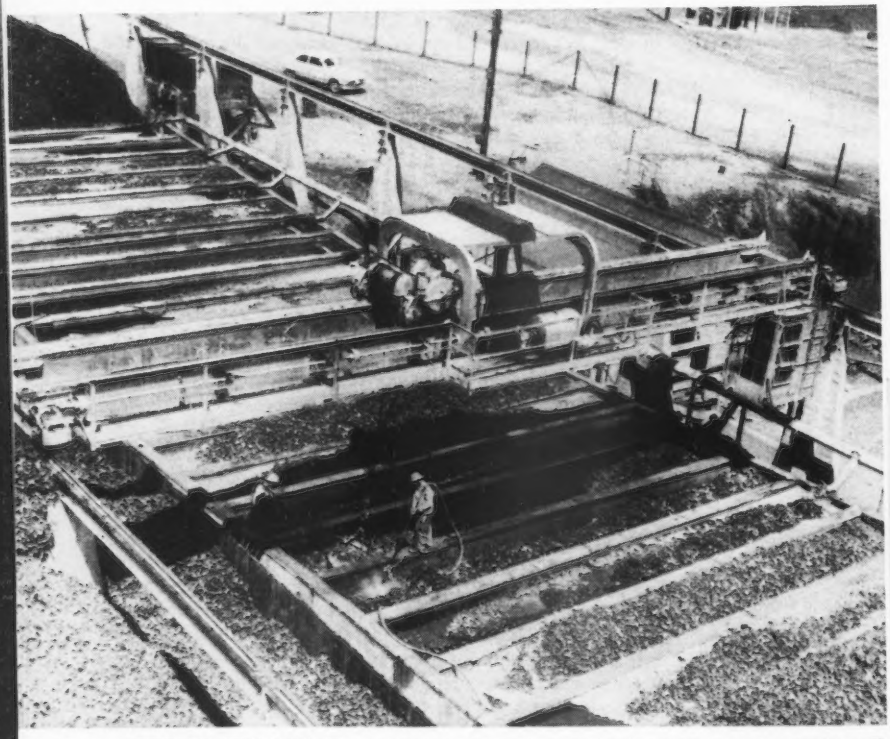
Production At Shallee Lead Mine

Financial Year	1950/51	1951/52	1952/53
Ore Milled	8076 long tons	32,111 long tons	44,219 long tons
Lead Concentrates	123 long tons	668 long tons	1391 long tons
Grade of Conc.	58.46% Pb	61.60% Pb	65.00% Pb

Average silver content of the concentrates was 35 oz per long ton. Ore contained 5% $BaSO_4$ which was rejected in the tailings.



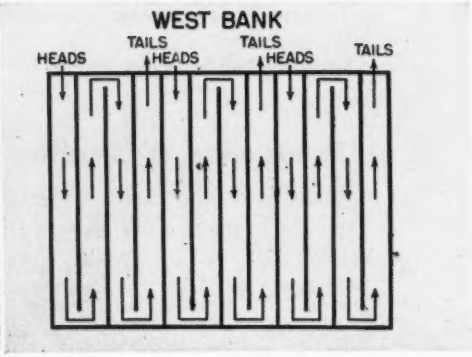
CAN SLIDE is right under trestle, next to leach plant for easy handling.



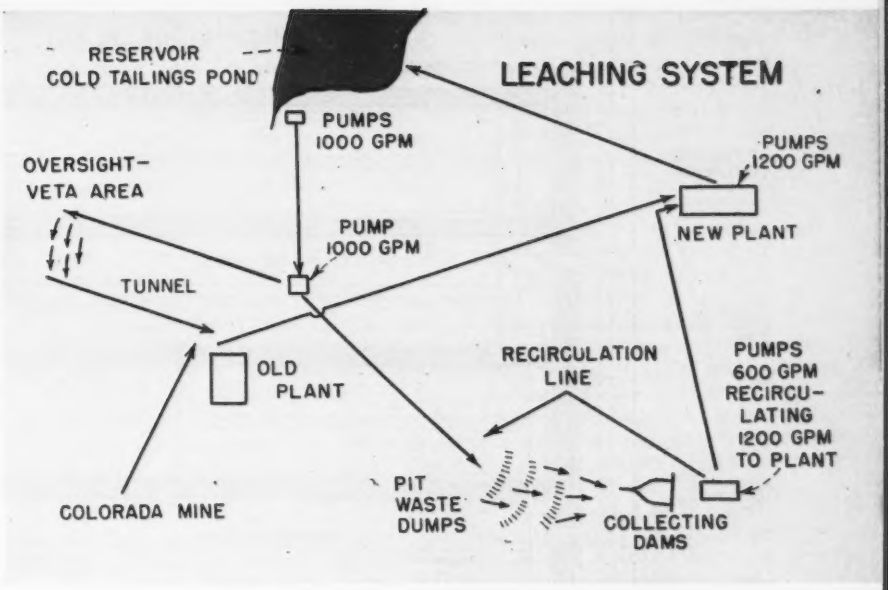
COPPER IS WASHED as magnet-equipped crane feeds more cans to nearby cell.

Simplified materials handling, flexibility in solution flow feature . . .

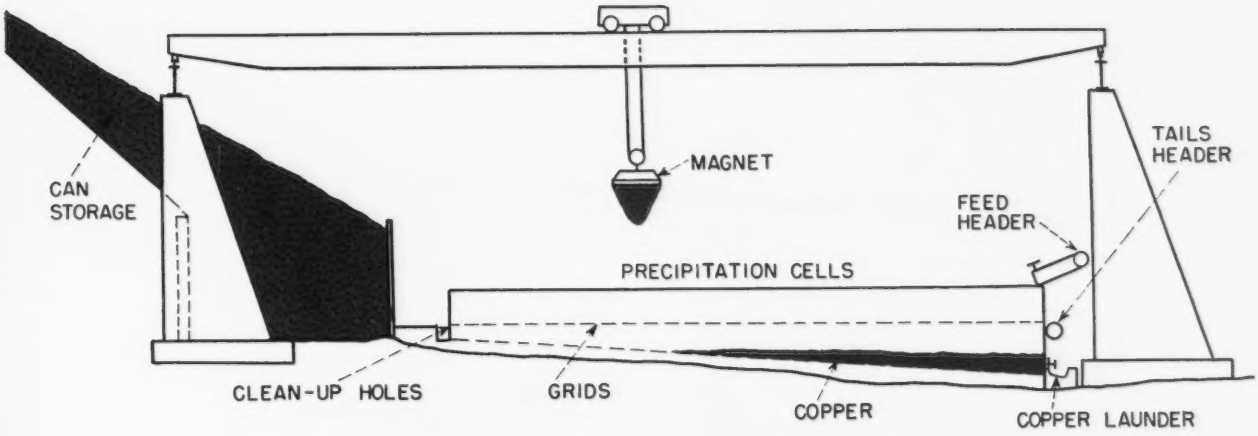
New



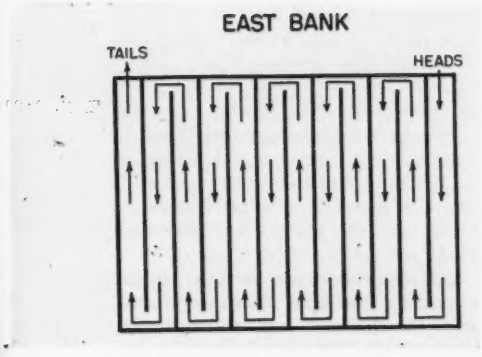
SOLUTION FLOW DIAGRAM shows



LEACHING SYSTEM was expanded to include the Oversight-Veta underground area and open pit dumps and to continue leaching at the old underground mine.



Leaching Plant at Cananea



west bank operating as 3 units of 4 cells each.

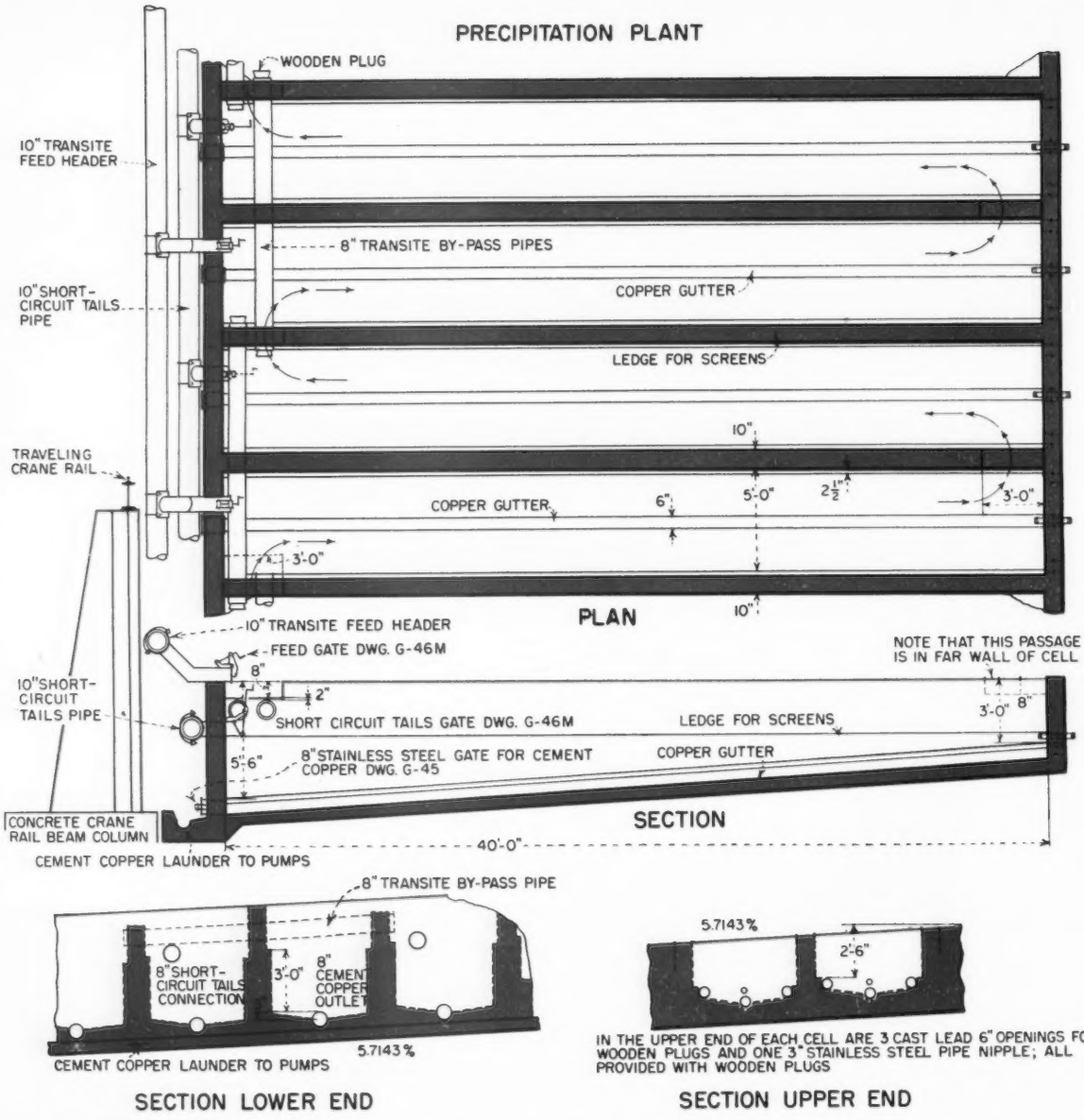
ROBERT C. WEED
Planning Engineer
Cananea Consolidated Copper Co., S.A., Sonora, Mexico

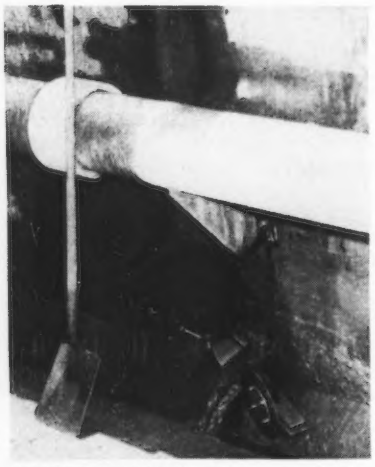
THE PRIME CONSIDERATION in designing and building the new copper precipitation plant at Cananea Consolidated Copper Co., Cananea, Sonora, Mexico, was to facilitate addition of shredded cans to the precipitation tanks and removal of cement copper. Attention was also given, of course, to providing adequacy and flexibility of solution flow, but our chief aim was to simplify the materials handling job.

The plant is, therefore, located so that cans can be fed by gravity to the crane that charges the precipitation tanks. The cement copper is pumped as a slurry directly into the concentrate thickeners at the concentrator. Thus, the only labor involved in operating the plant is that of charging the cells with cans and of washing the cement copper down to the slurry pumps. Details are given in the following discussion.

New Plant Built

Although leaching has been carried on at Cananea for years, it has hereto-





COPPER SLUDGE washes out of cells into concrete launder during clean-out.

fore been a small-scale operation, limited to the underground mine. It was decided in the spring of 1951 to expand the leaching program to take in the dumps from Cananea's open pit operations (See *Engineering & Mining Journal,* for December 1944 and September 1954), and the Oversight-Veta underground area. The old precipitation plant was antiquated and inadequate to handle this expansion, and a new plant had to be built.

Design of the new plant was based on a study of available literature, visits to a number of properties in the Southwest, and a long period of laboratory work to determine the best leaching and precipitation conditions.

Pipeline construction began in late 1951, under the direction of Charles Daume and W. R. Edmondson, mine master mechanic and assistant master mechanic, respectively. Laying the pipelines took nearly a year, and about 30,000 ft of pipe was used. The lines are of Transite, except where pressures run too high, and then cement-lined iron pipe is used. The mine shop crews also installed pumps, built pump houses, and did much of the plant pipe and valve installation.

Work on the plant proper began in March 1952, under the direction of L. B. Foote, construction superintendent. Construction progressed satisfactorily, and the plant began operating in March 1953.

All excavation was directed by the open pit department. The underground mine department took care of dam construction and miscellaneous work. Jack Lester supervised steel erection.

Source of Solutions

Copper-brearing solutions come to the new plant from three sources: 1, the Colorada underground mine; 2, the Oversight-Veta underground area; 3, the Colorada Pit waste dumps. Location of these areas and of the lines connecting them with the plant is shown in an accompanying drawing.

Water for the Colorada mine leaching comes from normal underground seepage. Water for the Oversight-Veta area and the pit dumps comes from a reservoir formed by an old tailings dam.

This source of water is a fortunate circumstance, not only as to amount available, but also as to the nature of the water. Tests show it to be high in acid and ferric iron and, therefore, an excellent leaching agent.

This water is pumped at the rate of 1,000 gpm to a 1,000-gpm "pivot" pump (see diagram), which can send water either to the Oversight-Veta area, or to the pit dumps. Effluent solution from the Oversight-Veta area runs out of an old haulage tunnel and joins the flow from the Colorada mine near the old precipitation plant. A gravity drain line takes this combined flow down to the new plant.

For the pit dump leaching, water is pumped to open ponds about 100 ft square on top of the dumps. Percolating downward, solution is caught behind three collecting dams below the dumps and is pumped to the new plant. These dams and the pumps are arranged so that, later on, low-grade solution may be pumped back up on the dumps and recirculated. So far this has been found unnecessary.

All new pumps are operated by automatic start-stop controls, and have a positive suction wherever possible. Pipelines and pumphouses were laid out with a view to possible future expansion of the leaching program.

Plant Construction

It was decided to charge shredded cans into the precipitation cells by means of a crane, and a crane already on hand at the old Cananea concentrator was adopted for this purpose. This was an overhead bridge crane of 7½ tons capacity with a span of 42 ft. According to the manufacturer, this crane could be lengthened in span by 20 ft 6 in. Thus the limiting factor in the design of the plant became the crane width of 62 ft 6 in.

As the photographs show, the plant was located so that cans could be dumped onto an inclined apron directly from the gondolas in which they are shipped to Cananea. This apron directs the cans to the storage area under the craneway. The crane uses a suspended magnet to charge the cans.

Solutions from the underground areas join the flow from the pit dumps in a weir box in the plant area. This box has an automatic flow recorder and an automatic solution sampler. The solution is then distributed to both ends of the plant through a 10-in. Transite header.

The plant consists of two banks of concrete precipitation cells, with 12 cells in each bank. The cells are 40 ft long, 5 ft wide, 5½ ft deep on the deep end, and 3 ft deep on the shallow end.

The cell depth is divided roughly in half by a shoulder, on which rest stainless steel grids that support the cans. As the solution passes over the cans, the cement copper drops through the grids and collects in the bottom of the cells. This process is aided by agitation with compressed air using blow pipes to stir up the mass of cans. Each bank of cells drains toward the middle of the plant.

Solution Flow

Solution enters each of the two banks at the upper, or outside, ends, and flows back and forth through the cells until it reaches the tailing sump. Solution level in each cell is fixed by the height of the overflow portal between adjacent cells. When solution reaches the tailing sump, it has been stripped of practically all of its copper. An automatic sampler is in the tailings line at the sump. Spent solution is pumped back to the old tailings pond, which acts as the leach solution reservoir.

Because the copper is removed quite rapidly from solution, it is not always necessary to run the solution through all the cells in series to strip it completely of copper. Therefore, provision was made to run solution directly to the tailing sump from any pair of cells. It is also possible to add pregnant solution from the header line to any pair of cells. This feature enables each bank of 12 cells to be broken down into two 6-cell units or three 4-cell units, providing a flexibility that helps to improve efficiency and increase capacity.

Copper Clean-Up

Precipitated copper is washed from two adjoining cells at a time. When a pair of cells is ready for washing, it is isolated by by-passing solution from the cell above the pair to the cell below by means of the by-pass pipe cast in the concrete at one end of the cells. Thus production from the rest of the bank is uninterrupted.

In washing, the copper drain door at the low end of the cell is opened, and excess water is drained off, running into a recirculation sump to be pumped back into the feed header. Then high pressure water from a fire hose is used to wash the copper from the remnants of the cans still on the grids.

Having collected on the cell bottom, the copper is washed into a central gutter that runs down the length of each cell. Then by water jet through holes in the cell wall at the shallow end, the copper slurry is sluiced down and out of the cell. It flows by gravity through a collecting launder and a pipe to the conditioning tanks.

Two units are provided to prepare the copper slurry for pumping to the Cananea mill's concentrate thickeners. Each unit consists of a 7x7-ft conditioner, or agitator, tank, two rubber-lined pumps in series, and a Transite pipeline. Each agitator tank is equipped with a turbo-mixer, consisting of a special impeller driven by a vertical shaft from a drive mounted over the tank. The impeller turns slowly, merely keeping the cement copper in uniform suspension.

The tank is connected to the suction of the series pumps. Around 200 gpm of slurry at about 10% solids is then pumped through the 4-in. pipeline against a head of 180 ft over a distance of 400 ft. A small line is necessary to maintain a high velocity so that the copper will not settle out.

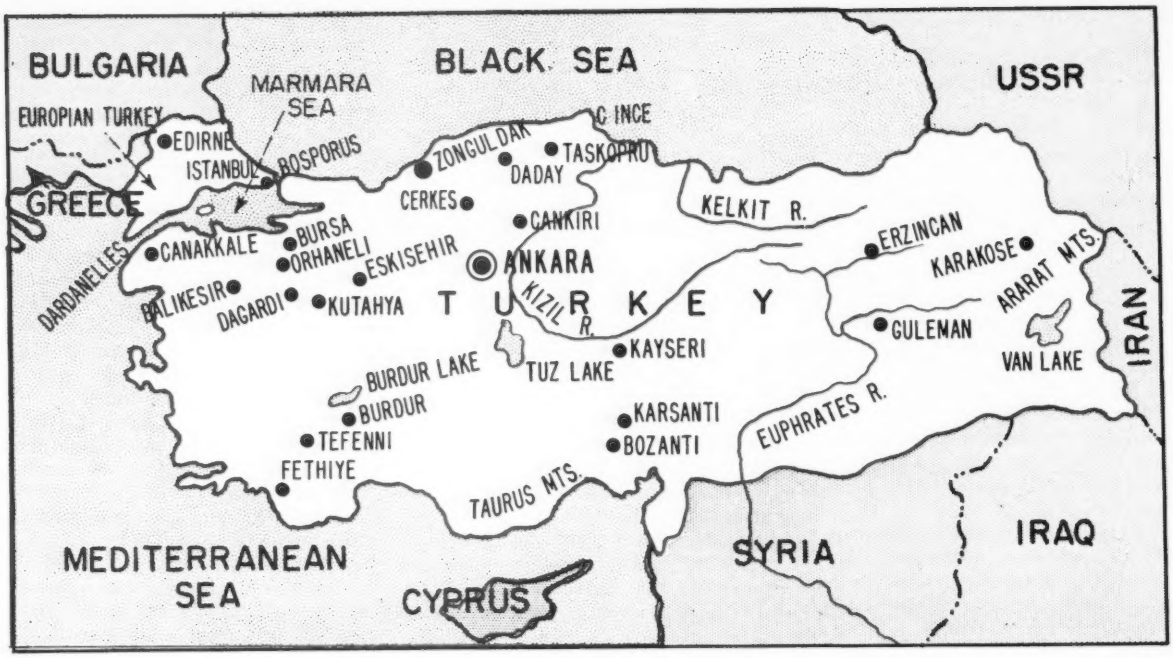
After each pumping period, the line is drained and back-washed with fresh water. The slurry runs by gravity from the end of the pipeline down an open launder to the concentrate thickeners. It is sampled by an automatic sampler, and the flow is measured by a Parshall flume with a totalizing-recording meter.

Summary of Results

The plant and the leaching are operating under the supervision of A. D. Wagner. A crew of seven men is required for three-shift operation.

Although the plant has not been in operation long enough to give reliable information on what iron consumption is likely to be, it appears that it will settle at a ratio of about 1.25 lb of iron per lb of copper. The feed averages around 2.5 g/l of copper, and the spent solution runs about 0.15 g/l. Top capacity of the plant has not yet been reached, but it will probably be somewhat in excess of 1.0-million lb of refined copper per month.

Throughout the design and construction of the leaching lines and the precipitation plant, every effort was made to adhere closely to the objectives of flexibility, uniformity of conditions, and efficiency of operation.



Chrome ore mining areas and potential areas in Turkey

Chrome Ore Mining in Turkey

Geology, methods, costs, law

BY H. FERID KROMER,* E.M.
Istanbul, Turkey

TURKEY IS RICH in underground mineral resources. Its bituminous coal basin at Zonguldak north of Ankara near the Black Sea is considered the richest in the near East. It has deposits of most important metals and uranium, oil, and some nonmetallic minerals. Turkey has mined and exported chrome ore for over 90 years. Following the development of the Government controlled Güleman chrome mines, exports increased until 1939 when World War II reduced output and exports. Favorable world market conditions plus the Turkish currency devaluation of 1947 led to exploration for new orebodies and intensive working of existing properties, and an increase in exports (Table 1).

Major firms contributing to the increase of chrome ore production, and the amount of their exports are shown in Table 2.

The rapid increase in the value of chrome ore is indicated in Table 3.

The minimum f.o.b. prices for the past four years as set by the Committee of Chromite Producers of Turkey are summarized in Table 4, by grades of chrome ore exported. The Committee has the authority to withhold export licenses if the price is below the minimum.

Chrome ore exports have become important in acquiring scarce dollar exchange for Turkey. In 1950, chrome ore exported by private producers provided $5,300,000; in 1951, $9,850,000; 1952, $11,530,000 and in 1953 about $25,000,000 in dollar exchange. In 1950, chrome ore provided about 60% of the total Turkish mineral export tax of 3,440,000 lira. About 180,000 workers were employed in 1952 for an average of 285 days by private chromite producers in Turkey.

Geological Description

Though the geology of chrome ore occurrences in Turkey has been investigated to some extent by the M.T.A. of Ankara (the government's Mining Institute of Research and Exploration), no complete study has been made.

1. Northern Alpine Chrome Region: Chromite occurrences in this region are characterized by small lenses of massive ore in sharp contact with the enclosing rocks. The lenticular bodies are oriented with their planes of greatest dimensions roughly in a northwesterly direction. Most of the occurrences are grouped around Cankiri with about 44% Cr_2O_3 content and small reserves are reported in Cerkes, Daday and Taskopru.

2. Southern Alpine Chrome Region: Extends from Fethiye to Güleman. The ore occurs mostly in forms of elongated bodies or seams of varying thickness. The longest dimension in the direction of mineralization may reach 300m. The thickness of the seams may attain 6m. Indications are that the deposits persist in depth and reach 120m as in Sandalbasi and Yuruk (Cenger). Most of these consist of spherical and spotted ore. The spherical bodies are the segregates of chromite crystals and serpentinized cementing material. Some of these spherical ores consist of well rounded individual chromite crystals, and the others consist of alternating layers of chromite and olivine. The spherical shape of these grains are probably due to the corrosion of original angular crystals while sinking in the liquid magma. The spherical and spotted ore of this region is accompanied, however, by sprinkled and banded ore,

* Consulting Mining Engineer, Is Bankasi Hani, 3/6, Galata, Istanbul.

Table 1. Turkish Chrome Ore Exports

(Metric Tons)

Years	Tons	Years	Tons	Years	Tons
1939	192,840	1943	80,832	1947	183,672
1940	110,040	1944	149,184	1948	294,396
1941	86,208	1945	62,688	1949	353,244
1942	116,796	1946	37,336	1950	352,596

Table 2. Turkish Chrome Ore Exports by Private Producers

Tons

Name of Producers	Exports 1949	1950
Turkish Mining Co. Inc.	24,730	25,190
Turkish Chrome Co. Inc.	33,122	6,500
Fethiye Mining Co. (T.A.S.)	13,144	14,634
Orhan Brand and Partner Chrome Co., Inc.	22,323	26,630
Bastas Turkish Mining Co. Inc.	4,500	7,800
Sakir Yorulmaz Mining Co.	5,736	713
Mine Search and Exploitation Co. Ltd.	3,750	3,500
Stanley Paterson	3,890	3,025
Bilgin Mining Co., Ltd.	13,500	9,600
Chromite Co., Ltd.	19,100	76,067
Tekirora Co.	.....	4,098
Others	.....	48,014

Table 3. Average Value in Dollars of One Ton of Exported Chromite

(1 Turkish Lira = 36 U.S. Cents)

Years	Average Value	Years	Average Value	Years	Average Value
1932	11.36	1939	10.41	1945	29.59
1933	10.41	1940	12.66	1946	27.73
1934	9.16	1941	12.66	1947	33.05
1935	8.51	1942	13.39	1948	35.94
1936	8.47	1943	15.72	1949	36.72
1937	9.68	1944	28.64	1950	36.92
1938	10.67				

Table 4. Minimum f.o.b. Dollar Prices of Turkish Chrome Ore Exports, by Grades of Cr_2O_3, in Percents

Years	48%	46%	44%	42%
1950	30	28	26	22
1951	35	33	30	26
1952	42	39	35	32
1953	45	42	38	35

and the average grade of chromic oxide is lower than 44%. Still other portions in small amount belong to a massive ore type with about 50% Cr_2O_3 content.

Fethiye deposits extend mainly in North-South and East-West directions, between which lie the less important portions which are located in NE-SW direction. The E-W formations are younger, and they seem to have caused several slips in N-S occurrences along the fault planes. The sharp contact between ore and enclosing rock is characteristic of the deposits; this suggests that the formations are seated by penetration of fluid magma carrying the ore along the solidified cracks.

Besides the Fethiye and Güleman deposits, the regions of Yesilova and Tefenni (Burdur), Bozanti and Karsanti in the Taurus Mountains which may be included in the southern ophiolitic region, are important for chrome ore. In the Eseler Mountains of the Burdur District is a series composed mainly of basic, ultrabasic and intermediate intrusive rocks spotted by dikes of andesite-diorite series, containing 56% silica, 16% alumina, 5% iron oxides and 5% lime. The serpentine of the Eseler Mountains extends about 90m in N-S direction, and it makes large contacts with younger limestone at the SE of Tinnax Tape, the East of Yesilova and the South of Tefenni.

The distribution of chrome ore in Burdur is somewhat erratic. However, it generally follows a N-S line which starts from Yesilkoy in the south and comprising Gokarik, Domuzcami and Topdusen mines, and ends at the Manatir and Doganbaba occurrences in the northern part of the Eseler Mountains.

Most of the occurrences are veinlike and make generally sharp contacts with the surrounding wall. The chrome ores are confined to rocks of highly mafic character, making it usually easy to delimit the field of search.

The physical character of vein ores are similar in this region; they are friable and of dull dark color. The thickness of veins vary between 0.6 meters and 4.0 meters. As an interesting occurrence the Gokarik Mine of Tefenni (not typical) shows about 400 sq meters of working face. The average result of analysis made on 20 different samples of the Yesilova district gave 40% Cr_2O_3 and 4.6% SiO_2. Gokarik mine grades around 47-48% in Cr_2O_3 content.

3. Central Chrome Ore Region: The major localities are Canakkale, Balikesir, Orhaneli, Dagardi and Tavsanli, Northern Eskisehir, Denizli and Cardak, and the Northern part of Burdur Lake.

The most important was Dagardi, which now is considered depleted. About 380,000 tons of chrome ore with an average of 50% Cr_2O_3 has been mined in Dagardi. The deposits, in pipelike form, may be regarded as explosion vents in which differentiation by crystallization has taken place. This is accompanied by early separation of chromite crystals by sinking and accumulation in the lower part of the magmatic body. The uplift and erosion must have brought such masses to the surface. Other pipelike formations of less value are encountered on surfaces of tectonic movements near the main deposits of Dagardi.

Other important deposits of the Central Chrome Region are the Kavak, Basoren, Tastepe, all in Eskesihir, and those in Orhaneli and Bursa.

The Kavak mine consists mainly of three independent massive lodes of conical shape with their apex upward. One of these conical masses is partly eroded. The reserves are estimated to be high with 38-42% Cr_2O_3. It is assumed that the ore is a result of differentiation by crystallization. The ore fades out gradually in the enclosing rock. It is concentrated by using Humphreys Spirals. An analysis of the concentrated product showed: 47.1% Cr_2O_3, 5.4% SiO_2, 13.2% FeO. The property is being operated by Turk Maadin Anonim (The Turkish Mining Co.) which has invested more than 2.5-million lira ($900,000 at 1 lira=36c) for the mine plant and development during the past 10 years.

The Bahtiyar mine of the Kavak mining district deserves attention as the continuity of the ore in depth is very likely to lead to high tonnage in reserve. About 80% of the run-of-mine needs to be concentrated.

The Basoron mine consisted mainly of one huge lens of about 80,000 tons reserve which now is largely depleted.

The Tastepe mine is a typical lens

Table 5. Underground Mining Costs in Turkish Lira Per Ton of Ore Sorted at Tastepe Chromite Mines, Eskisehir

(1 Turkish lira = 36 U. S. Cents)

Period covered—April 5 to Dec. 5, 1950
Sorted chromite ore..... 7,800 Tons
Sorted waste..... 4,200 Tons

Output hoisted..... 12,000 Tons

	Labor	Super-vision	Power	Explo-sives	Sup-plies	Tota
Prospecting, exploration and development	0.35	....	0.10	0.15	0.11	0.71
Mining	0.90	....	0.47	0.44	0.25	2.06
Underground tramming	0.80	....	....	....	....	0.80
Hoisting	0.15	....	....	....	0.05	0.20
General underground Expenses	0.02	0.22	....	....	....	0.24
Surface exploration applicable to underground operations	0.20	....	....	....	....	0.20
TOTAL Underground Expenses	2.42	0.22	0.57	0.59	0.41	4.21
Surface sorting	0.43	....	....	....	....	0.43
TOTAL Direct Mining	2.85	0.22	0.57	0.59	0.41	4.64

formation. The mineralization has probably taken place by segregation. The lenses are aligned in a NW-SE direction. The major findings are located at the end of the mineralization line which is about 600 meters in length. Some of the lenses are nothing but masses separated from one originally formed elongated body by the planes of faults in an E-W direction. It is indicative that in a westward direction the strike slips remain under 15m. This was the major guide in determining new lodes by diamond core drilling in this property during 1953.

The Hermancik Mines (Bursa) are artinitic and show distinctly the characteristics of a vein deposit. The mineralization zone is well formed along the fissure in rock. The mineralization has probably taken place during the late stage of magmatic segregation during which the ore again melted and was injected into the cracks produced in the country rock. The thickness of the vein varies 0-2m, reaching the length of about 1 km. The present underground workings are 60m below the surface. The ore is said to contain 46-50% of chromic oxide with a high Cr:Fe ratio.

Underground Mining Methods and Costs

In the Tastepe mines, owing to the small size of individual lenses and the firm hanging wall, no supports, filling or pillars are necessary. In instances where the hanging wall is unreliable, as the case is in the Karacaorn Chromite Mine of Eskisehir, waste filling is made while the ore is worked upward. We give in Table 5 some cost data on our own property, the Tastepe Chromite Mines, Eskisehir

The low cost of direct mining on this property is a result of the minimum sorting required owing to the character of the ore, the reliable rock walls making timbering unnecessary, the lens shape of the orebody, and the extent of mechanization. Where the hanging wall is inadequate and timbering is necessary the timber cost may be 4 lira per ton of ore. In some cases with unfavorable physical and geological conditions and inadequate management, direct mine costs reach 24 lira per ton of ore.

The importance of the ore character is indicated by the sorting expense of 3.5 lira per ton of ore at a nearby mine of similar capacity. The ore at this mine has 40% fines and the banded structure of the ore with serpentine of the same dark color make sorting difficult.

Table 5a shows wage rates per day in Turkish lira and the number of persons in the various occupations.

Mechanization has been important in reducing direct mine costs, as indicated in Table 6.

Taxes: There are three major taxes:

1) Sales taxes are applied to all mineral or metal production. For chrome ore it is 5% of the ore's f.o.b. value, if the mining is done under concession rights. Under research permits this tax is 20%. If the ore is concentrated by mechanical means the tax is 1% of the f.o.b. value.

2) The income tax is universal, and the following scale applies (in Turkish lira):

For the first 2,500 portion of income, the rate of income tax is 15%
For the following 5,000 portion of income, the rate of income tax is 20%
For the following 10,000 portion of income, the rate of income tax is 25%
For the following 20,000 portion of income, the rate of income tax is 30%
For the following 20,000 portion of income, the rate of income tax is 35%
For the following 20,000 portion of income, the rate of income tax is 40%
For the following 22,500 portion of income, the rate of income tax is 45%
For incomes above 100,000 T.L. the rate is fixed at 35%.

3) The corporation tax is universal and is fixed at 10% of income.

Transportation Costs: Truck transportation on dirt roads varies between 0.11 and 0.16 lira per ton-km. When the road is stabilized or of asphalt, the cost varies from .06 to .10 lira per ton km. The railroad freight rate is 0.066 lira per ton-km. Loading railroad cars at stations varies between 0.9 and 1.2 lira per ton; at ships in ports between 4.5 and 6.5 lira per ton.

Potential Mining Areas

Almost all chrome mines in Turkey were discovered from visible outcrops rather than rational prospecting. Often mines were prematurely abandoned owing to a belief that all ore was depleted. The Bozanti chrome ore area was redeveloped during 1952 and produced about 160,000 tons of ore; reports are that 300,000 tons of ore remain. The Karsanti district in the Eastern Taurus Mts. may contain chrome ore in sizeable quantities.

The Tastepe chrome mine was abandoned in 1947 for lack of reserves; our new workings there have produced 26,000 tons of metallurgical grade chrome ore. In 1953 significant amounts of chrome ore were proven at the Karaagac mine (Sazak) and the Karatarla mine both of which were abandoned about 20 years ago.

Some remote areas have been neglected which may contain large chrome ore reserves. The Kelkit river valley in northern Turkey, Kayseri and Erzincan regions, Karakose in eastern Turkey and the Ararat Mts. are potential chrome ore areas. The Governments' Uckopru (Mugla) areas contain huge chrome ore deposits.

The pegmatite and pyrometasomatic zones in Asiatic Turkey, mined for centuries, deserve more attention, especially in connection with the rare minerals. The granite and granodiorite intrusions should receive engineering attention at Edirne in European Turkey, Ezine and Kazdagi in the Dardanelles district, Kapudag (the mountain peninsula in the Marmara Sea), Egrigoz Dagi in the Kutahya district and Uludag in Bursa. The Government is now surveying the Kapadaz and Uludag areas. Uludag has scheelite with .14-.85% WO_3 (recent investigation suggest 2.0% WO_3).

Some epithermal regions of east

Table 5a. Direct Mine Labor Cost in Turkish Lira at Tastepe Chromite Mines, Eskisehir, Turkey

(1 Turkish lira = 36 U. S. Cents)

Number of workers	Occupation	Av. wage rate, T. L.	Cost per day, T. L.
12	Drillers and field prospectors	3.30	39.60
9	Trammers	2.82	25.40
2	Hoistmen	2.35	4.75
10	Ore sorters	1.36	13.60
2	Motorman, guards	4.92	9.85
1	Supervisor	4.00	4.00
36			97.20

and northeast Turkey have lead, zinc and silver ores. There are crystalline schists intruded by thick syenite-porphyry (tertiary) dikes. Four occurrences have been noted, some of them pyrometasomatic. Paragenesis: pyrite, lollingite, sphalerite, chalcopyrite, galena, and marcasite.

The government does not have sufficient funds for mineral exploration of Turkey. Private capital, local and foreign, is necessary in order to find and develop fully the mineral wealth of Turkey.

Establishing a Mine in Turkey

In the past few years private enterprise has become more important in mining, relative to the State. All mining areas in Turkey, including petroleum areas, are open to local and foreign private capital, except the bituminous coal fields in the Black Sea coast. The number of applications for mineral exploration permits, exploitation permits and concessions for exploitation have increased greatly in recent years. And 210 abandoned mines, which had reverted to the government, have been reopened.

The 1950 Turkish law on foreign capital (not to be confused with the mining law), intended to encourage entry of foreign capital, was found unsuccessful and a new and apparently more workable one has been passed by the National Assembly. The new law reduces the restrictions on sending profits and other income, and capital, out of the country. Aliens may send income from the country in U.S. dollars. Foreign capital will get the same rights and privileges as local capital.

The basic principle of the present mining law is the concession system—mines are national properties and the State is the owner. Even after the Government parts with the title it may reserve to itself certain rights and royalties. Present economic and social conditions in Turkey probably justify this.

The acquisition of mineral exploration permits is open to real or juridical persons. Each is good for 2 years, covers 2,500 acres and only one mineral, but any number may be obtained. The exploration permits may be transferred with the permission of the Bureau of Mines in the Ministry of Economics and Commerce.

Exploitation permits may be acquired from the Ministry, good for a period of 5-10 years. There are few formalities or financial obligations. A concession of exploitation may be obtained from the Council of Ministers good for a period of 40-60 years.

Abandoned mines which have reverted to the Government are turned over to private interests at the discretion of the Bureau of Mines.

When an exploration permit has been granted the Bureau of Mines requires that within 1½ years an ore survey be made and an engineering report be submitted. The Bureau of Mines then determines an annual amount of ore which must be mined in order for the operator to maintain his rights. If the required level of output is not reached the royalty and sales tax must still be paid on the amount assigned by the Bureau of Mines. The operator must produce within 1½ years a topographic map at a $\frac{1}{5000}$ scale. If the above conditions are not fulfilled a fine of 2,500 Turkish lira must be paid. If the property is *leased* to someone else, rights to the property are withdrawn. The Government's conditions are intended to obtain conscientious working of the properties, or their acquisition by the Government.

The Turkish government has been preparing a new mining law intended to encourage and protect the interest of private mine investors, and reduce the formalities of acquiring mining rights. The basic difference of the proposed new law is that the mine operator may *lease* his property and also *mortgage* his concession right in order to obtain capital.

The proposed new law may also include the requirement that research, exploration, and exploitation be supervised by mining engineers, that exploitation rights be given only to "limited" companies, and that export taxes be reduced from the present 10-20% of the f.o.b. value of the ore to 1-5%.

Some decentralization of the Bureau of Mines is needed. Courts or advisory committees are needed to deal solely with mining disputes.

Table 6. "Productivity" and Direct Mine Costs before and after Mechanization of the Basoren Chromite Mine, Eskisehir

Productivity and Costs	Before (av. of 3 mo.)	After (av. of 3 mo.)	Changes in pct.
Productivity (Tons/man-day)	0.35	0.65	+83
Salaries, TL/Ton	11.59	6.67	−42
Explosives, TL/Ton	0.91	0.77	−15
Other Supplies, TL/Ton	2.21	0.37	−83
TOTAL Direct Mine Cost, TL/Ton	14.71	7.81	−47

Turkish Mining Problems

Capital is difficult to come by for the Turkish mine operator. Banks do not grant credit and ore reserves are not accepted as a guarantee for capital. Scarcity of capital has restricted ore exploration considerably, even though the cost is not great. (Indicative of these low costs is our own experience: we have conducted some chrome ore exploration in connection with outcroppings in South Turkey and the cost was about $3 per ton of cre established.)

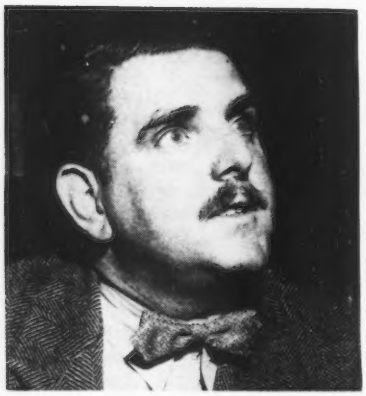
Technical help and advice is only available from the Government's Mining Institute of Research and Exploration—its scope is very limited.

Qualified mine labor is extremely scarce except in a few districts. Local peasants should be hired first and trained intensively before outsiders are brought in. The latter may be obtained from East Turkey where some at least partly trained workers may be found. They emigrate under their shift bosses in groups of 30-50. The attitudes of Turkish workers is determined largely by their present origin.

It is better that prospective mine operators in Turkey *purchase* mining rights than become a partner with existing holders of such rights. Also, rather than arranging ordinary contracts of transfer with such holders it is less risky to make the transfers through the Ministry of Economics and Commerce. The holders of mining rights should be approached delicately since they often have highly exaggerated notions of the value of the property. The property should not be investigated until arrangements are made with the holders. This should include a contract on an optional basis permitting acquisition of the property if it appears worthwhile, or its rejection.

All of Big Indian Wash has been staked now and still the prospectors, mining companies, speculators and fortune-seekers come. Threat of trouble over claim-jumping becomes more grave as Moab's "boom" population swells.

Big Boom at Big Indian



Merritt Ruddock, vice president, Cal Uranium Co., a Big Indian claim holder.

William McCormick is associated with Steen in Utex Exploration and Standard.

BURT MEYERS
Grand Junction, Colo.

TODAY, IT'S EASIER to raise $100,000 for a balloon ascent in a mine shaft than it was to get $100 for a grubstake two years ago—if the mine shaft is located in uranium-mad southeastern Utah.

That's the estimate of one geologist who keeps tabs on the mining district developed from one drill hole in the Big Indian Wash area.

Men, companies, and money are pouring into Moab, Utah, immediate headquarters for the development. Old line mining companies, oil companies, amateur prospectors, promoters, independent geologists and mining engineers—all have been crowding into the one-time agricultural center, which had about 1500 population before the boom started. Population now is at least 2500. Office space is at a premium; housing is almost impossible to find. One entrepreneur has said he is planning a building with 16 office spaces, and all 16 are already rented, with a waiting list for any vacancies which might occur in the still-unbuilt structure.

Charles Steen, the one man most responsible for the current boom, recently purchased a motel in order to have office space for his Utex Exploration Co. and affiliated firms. Less fortunate outfits are conducting business from house trailers, shacks, and even tents. Steen also is planning a housing development for employees of Utex; plans have been drawn by Salt Lake City, Utah, architects, and contracts have been let for the first 10 homes.

More million-dollar deals are discussed over coffee in Moab today than in probably any other town of similar

Cal Uranium's San Juan shaft, north of Steen's Mi Vida. A vertical 280-ft shaft was driven to the orebody, estimated to extend for 2500 ft and up to 25 ft thick.

There's no rimwalking in the Big Indian Wash area. Deposits are found by drilling.

size in America. Even though 90% might be hot air and dreams, enough have already been completed and announced to make even the skeptical pay attention when a dusty-booted stranger says, "And when he upped the ante to a million and a half I said . . . . ."

Claim Jumping

Practically every inch of land in Grand and San Juan Counties in Utah's extreme southeastern corner has been staked at least once. Inevitably, the locating activity has caused charges of claim jumping and those already in the field took steps in early March to form what is essentially a vigilante committee to protect their interests. At least one major lawsuit, involving over $1-million, has been filed; more law suits seem certain. With summer coming and hundreds more prospectors—many of them amateurs without knowledge of the basic principles of claim-staking—in the offing, the situation may well become tense.

Also causing some concern is the Atomic Energy Commission's Circular 7, which established a method for granting leases to tracts located on lands already covered by leases obtained under the Mineral Leasing Act of 1920. Many miners don't like Circular 7, though the Colorado Mining Assn. has paid tribute to it as an attempt to deal with what is admittedly a complicated and serious situation. With feeling already high over claim jumping, much of which is probably accidental or, at worst, an effort to take advantage of technical failures to meet requirements of the mining law, Circular 7 has made many prospectors conclude that their rights are so cloudy as to be almost impossible to determine. As a result, there's been much muttering about "falling back on a Winchester."

Most of the feeling is directed toward "big companies and amateurs." The first are feared because of charges that they'll "blanket everything in sight" with claims, then force prior claimants to withdraw through legal action that threatens to be too expensive to fight. The amateurs are feared for obvious reasons—not knowing what they're about, but eager to become another Steen, they'll drop stakes any place they can ride, walk, or crawl.

The frenzied rush to the Big Indian Wash had its start in 1951, when Steen staked 12 adjoining claims there. A former oil company geologist, Steen located the claims along the southwest flank of the Lisbon Valley anticline, back from the rim of Big Indian Wash (which takes its name from a monolith which somewhat resembles a large-sized redskin). Previous staking in the area was done by Dan Hayes and Donald Adams along the rim of the Wash.

Mineralization in the Cutler-Rico formation caused the original interest in the area, and Steen was drilling for Cutler-Rico when he moved in a rig July 3, 1952, to explore the property. Three days later, he struck ore at 70 ft—14 ft of high-grade uranium ore, identified as pitchblende or uraninite. The ore was discovered in the Chinle formation, above Cutler-Rico. (Only one rim outcropping in Chinle has been discovered in the area; that is on the Hayes-Adams claims, but was unknown at the time Steen drilled his first hole).

On Oct. 4, 1952, a shaft was started 30 ft southeast of the discovery hole, with the first ore being taken out two months later.

"Production from the Big Indian mining district prior to the Steen discovery was approximately 5,000 tons, produced over a four-year period," Steen recently reported. By Jan. 1, 1954, 52,542 dry short tons had been shipped from the Mi Vida, the mine Steen located with his first drill hole. Payment for this ore, including all

Charles A. Steen walks away from the Big Buck mine in the Big Indian Wash. Steen and Joseph Frazer recently formed Standard Uranium Co. to buy and work the claims.

factors, was $2,416,350, Steen said.

He estimated that as of October 1953, reserves of more than 2,175,000 tons had been located in the district. Several major finds since then have boosted the total into figures which are still growing but which are known only to the AEC.

Known reserves of Utex Exploration Co. (Steen's firm, in which he and his mother hold 81% of the stock, since buying out several minority stockholders in December for a reported $3,272,500) were at least 1,350,000 tons in October, and a drilling program is continuing. For 1954, Steen said, the production goal from the Mi Vida is 85,000 tons—not including production by G. & G. Mining Co., which holds a limited lease on 200 ft of the claim.

Hope for wealth like this is what has brought prospectors and mining companies rushing to the area, and Steen's discovery of ore in a new horizon has had far-reaching effects. There are now, according to an AEC geologist, hundreds of miles of Chinle outcroppings to be examined not only north and south of the Mi Vida mine, but also west—where a major find in the region between the confluence of the Green and Colorado Rivers has been reported.

Chinle is Big Producer

Major deposits have been uncovered in the Chinle in three areas of the Big Indian district. They are Steen's original find, in the central part of the district, another about 3 mi north, where Cal Uranium Co., Homestake Mining Co., and Big Indian Mines, Inc. (one of Steen's companies) and others have claims; and a third about 8 mi south, being developed by Continental Uranium Co.

Reserves for Big Indian Mines, Inc., were estimated by Steen at over a half-million tons in a Denver, Colo., speech. Other reserves listed were:

Christensen and Herrin	100,000 tons
Big Buck	100,000 tons
Little Beaver	100,000 tons
Cal Uranium	"large"

In addition Continental Uranium Co. is developing reserves on Utah School lands, leases on which are held by Jack O. Jones of Grand Junction, Colo. Continental formerly was Western Mines Development Co., a partnership; the name was changed when the firm was recently incorporated. Jones is vice president and general manager of the company. Other officers are Chicago, Ill., men, including Gerald Gidwitz, cosmetics manufacturer with extensive mining and oil interests.

The Big Buck claims recently were purchased by Standard Uranium Corp., which was formed by Joseph Frazer, ex-chairman of the board of Kaiser-Frazer Motors Corp., Steen, and others. Steen held an option on the claims, which was taken up by the new corporation. The purchase price for the 16 claims was reported to be "about $2-million." Additional exploration will be done with $500,000 already set aside for that purpose.

Directors of Standard Uranium include Steen; Frazer; William McCormick of Dove Creek, Colo., one of Steen's early backers; Fred D. Gerhardt of New York; Frank Crerie of Houston, and K. Ralph Bowman of Salt Lake City.

Merritt Ruddock is vice president of Cal Uranium and also of Southwest Development Co., an associated firm. Cal Uranium started a drilling program on its properties after drilling by the AEC had resulted in the discovery of a large orebody. Drilling revealed that the orebody was of "considerable size" and extended into the Big Indian holdings and other claims as well. Private exploration had revealed, by the first of the year, that the body ranged from 2 to 25 ft thick and extended 2500 ft in one direction and was 1500 ft wide at the broadest points. A vertical 280-ft shaft was driven to the ore to prepare for production.

Ruddock said, at the Colorado Mining Assn. convention, that Cal Uranium and its neighbors appeared to have blocked out over 1-million tons of primary uranium ore. He called the achievement "a fruitful blend" of effort by the AEC and private industry.

Big Companies

Homestake Mining Co. of San Francisco entered the Big Indian area in February with the purchase of La Sal Mining Co. T. C. Hudson, president and major (50%) stockholder in La Sal Mining Co. had announced several months earlier the discovery of a deposit up to 40 ft thick in the claims, ranging from .30 to 5% uranium oxide. Associated with Hudson in the sale (for which no price was announced), were Frank Richardson of Ouray, Colo.; H. H. Monday and Virgil Parker, Pawhuska, Okla.; and W. T. Hudson, Casper, Wyo.

W. T. Hudson is president of Little Beaver Mining Co., which also holds valuable claims in the Big Indian area (see above). Homestake reportedly has been negotiating for purchase of these claims, but no public announcement has yet been made regarding a sale. An early report from Moab said $1,560,000 had been offered for Little Beaver—a report that was never confirmed.

In charge of Homestake's operations is Paul Henshaw. Offices are maintained in Moab.

Homestake is the first of the major "old timers" of the mining industry to move into the Big Indian area, but many others have been scouting around. They've attempted to keep their activities quiet, naturally, but "pretty well substantiated" rumors have placed Anaconda Copper, Phelps Dodge, and National Lead among

those investigating the Big Indian area. They are also, of course, interested in other areas of the Colorado Plateau as well, and Anaconda is now operating a processing mill at Grants, N. M.

A Mill To Come

To take care of the ore now being mined and that which will come into production this spring, Steen has been exploring the possibility of erecting a processing mill at Moab. The AEC has been working with his engineers on the metallurgy and other problems; Moab expects to know the results of the investigation within a few months. Whether it is Steen or another firm, however, it seems certain that another processing mill, costing between $3-million and $5-million, will be established to handle the ore which Big Indian mines will produce—estimated by Steen to be 1,000 tons daily in the near future, excluding Mi Vida.

Foundations already have been poured for an ore purchasing station at Moab by the AEC, and bids have been called for on construction of the sampling plant. Ore buying on a "provisional" basis was to start soon after scales were installed—grab samples will provide an estimate on which preliminary payments will be made. After completion of the sampler, final assays and payments will be made to the ore seller.

William Isachsen, district geologist for the AEC in charge of a 25,000 sq-mi area which includes the Big Indian Wash, said the Big Indian is "all one district, geologically." He said it is one of the largest uranium districts in the world. (In a recent talk at Salt Lake City, Steen said he has been told, by men who have seen the uranium fields of Africa and Canada, that the Big Indian district exceeds anything to be seen abroad.)

Isachsen summed up the geology of the area informally in this way:

The Big Indian Wash area is located on the southwestern flank of the faulted Lisbon Valley anticline which trends northwest. A cross-section of the structure, from southwest to northeast, shows formations in the following order: Navajo; Kayenta and Wingate of Jurassic age; ore-bearing Chinle of Triassic age; Cutler-Rico (undifferentiated) of Pennsylvanian age; Morrison of Jurassic age; and Dakota, of Cretaceous age. A major fault of over 3000 ft displacement brings together Pennsylvanian and Jurassic beds.

The Lisbon Valley fault is one of the two principal geological features of the Big Indian district. The second is a broad anticline, which attracted Steen's attention originally because of a theory he held that since uranium and oil are both found associated with carbon materials, similar guides might be used in exploration.

Only a small fraction of the Chinle —a previously unproductive horizon except in northern Arizona—has been explored, though the exploration has been going on at an almost feverish rate since Steen's discovery. Much uranium prospecting in the past has been based entirely on rimwalking, but the more expensive drilling is the chief guide to ore now. Only the one mineralized outcropping has been reported in the exposed portion of Chinle in the Big Indian district; therefore "you have to find a favorable host rock and drill." One indication of ore is that the mineralized horizon in Chinle is gray-green in the Big Indian, in contrast to the more common red. This alteration color may lend support to the theory that the deposits are hydrothermal—carried up from some deeper formation in warm water—and that the action could have occurred at any time and may still be continuing.

Virgin Territory

The wider range of exploration for uranium in the Colorado Plateau as areas like Big Indian are opened was indicated by Phillip L. Merritt, assistant director of the Raw Materials Division, Atomic Energy Commission, when he said: "In the Colorado Plateau, it is now obvious that uranium is not particularly selective in seeking a stratigraphic horizon in which to rest.

"As a matter of fact, mineralization has been found in at least 18 different mappable stratigraphic units ranging in age from Upper Paleozoic through Tertiary, and important production has been derived from five different formations.

"For instance, the rocks of the Jurassic Morrison formation were once the only significant source of uranium in the central Colorado Plateau. Intensive exploration has continuously expanded the producing areas of the Morrison; and consequently we can see many years of mining life ahead."

One striking fact is that a formation which may be the chief producer in one area is less important than some other formation in another area: The Saltwash, for example, is outstanding in the Uravan mineral belt, but "distinctly subordinate" to the Chinle in the Big Indian district, on the basis of present knowledge.

The multiplicity of producing horizons, as the exploitation of domestic resources continues, makes particularly apt the description of the uranium industry of the Colorado Plateau as "a lusty youngster just reaching maturity." Sheldon P. Wimpfen, from whom that phrase is taken, is manager of the AEC's Grand Junction Operations Office, Grand Junction, Colo. He said recently that the number of mines "shipping to market increases by 15 to 25" each month; the total now is over 550—an increase of 20% in a year.

Wimpfen said the accomplishments of the mining industry in developing new ore reserves "have been particularly noteworthy.

"A year ago it was indicated that a find made by Charles Steen in the Big Indian Wash area was an extremely important one. During 1953, as the mine was developed, it became apparent that this mine was not only an exceptional deposit, but that it was one of ample size to justify a new milling installation."

The optimism for the domestic uranium industry isn't confined to the one area, of course. Extension of guaranteed prices for uranium through March 30, 1962, has "established a firm economic foundation on which private industry can plan ahead. That the mining fraternity has been quick to recognize this situation is evidenced by the tremendous influx of new dollars and people to find more and more ore deposits," Wimpfen declared.

By March 1, bonus payments for ore produced from new mines had been made to 388 properties. Since the bonus was started in 1951, more than $3-million has been paid out. It is paid on the first 10,000 pounds of uranium oxide produced from any new mine; 50 have produced more than 10,000 pounds and are no longer eligible for the bonus, which totals between $15,000 and $35,000, depending on the grade of ore produced. The payments now are being made at the rate of $175,000 a month.

Unclaimed Prize

(This is not the same, by the way, as the standing prize of $10,000 offered by the AEC for the first 20 tons of non-carnotite, non-roscoelite ore assaying at least 20% uranium oxide to be found in the United States. For a time, Steen stockpiled all ore from the Mi Vida averaging above 20%, intending to claim that prize—"more for the fun of it than for the money." But he's dropped the project, preferring to let the extreme high-grade go along to the mill with the rest of the ore. Separating and stockpiling it was expensive and troublesome. Reported still interested in the prize is Vance Thornburg, owner of the Seven-Mile mine north of Moab, but his progress hasn't been reported recently.)

WASHINGTON IMPACT

Morton A. Reichek, McGraw-Hill Washington News Bureau

Mineral Policy Committee Recommends Increased Stockpiling, Exploration Aid

ADVOCATES OF IMPORT RESTRICTIONS or subsidy plans as means to aid domestic mining will find little to make them happy in the report of the President's Mineral Policy Committee. At press time, the formal report was still unpublished. But prospects were that it would recommend:

- Increased stockpiling — including lead and zinc—carefully defined as a defense measure.
- Continued Government aid for mineral exploration.
- Revamping of the Public Land Laws to resolve conflicts created by multiple land use.

The decision to boost stockpile acquisitions was a tortuous one. Washington is still sensitive to criticism that the stockpile has been used as an "ever normal granary" to support commodity markets. That's why stockpiling was not recommended outright as an economic prop.

Some Committee representatives argued that stockpile buying as a price support device would weaken the stockpile's character, discourage foreign producers of the most critical materials like nickel and industrial diamonds from selling to us. Others pointed out that stockpiling is only a short-range program, provides no basic aid to mining anyway.

So the Committee cautiously explains the new move in terms of security: Stockpile objectives were created by subtracting (1) estimates of military and essential civilian requirements for a five-year war from (2) projected domestic output and imports. But the rate of domestic production—particularly for lead and zinc—has declined below projected level. So, the need for expanded stockpiling.

Domestic miners will have to share with foreign producers what bonanza will be developed by the new stockpile goals. In fact, the State Department cited the possibility of increased stockpiling as an aid to Latin American metal producers at the recent Caracas Conference.

Just before the Mineral Policy Committee put the finishing touches to its report, ODM clarified its policy on stockpile disposals to assure producers that surpluses won't be dumped on the market. The agency's announcement: Deliveries under DMPA Contracts—placed to stimulate expansion in lead, zinc, copper, and other strategic metals, not for stockpiling—now coming in above market prices, will be added to the stockpile or at least be withheld from the market.

The President's Mineral Policy Committee shows that the Administration is standing firm on the tariff issue, that it's unwilling to give ground to pleas from mining—and other industries—for import restrictions to aid domestic industry. The Interior Department had recommended more serious consideration of tariffs as the major aid to mining. But State Department influence was stronger.

The tariff issue is still up in the air, however. The Administration may be standing firm, but Congressional protectionists are getting set to strengthen their campaign. They're optimistic the Tariff Commission will determine that domestic lead and zinc producers have been injured by imports and recommend tariff hikes to the President. They feel this would put the White House on the spot. Disregard of the Commission's finding would show up the escape clause as a snare and might impede extension of the Reciprocal Trade Program, the protectionists believe.

Assuming that the Trade Agreements Act is extended, however, Sen. Malone has introduced a bill (S. 2992) to offset the program. The bill creates a "strategic and critical minerals and materials authority," which would determine when strategic domestic industries are injured by imports, then establish new import restrictions overriding the Trade Agreements Act.

The Board would consist of the Secretaries of Interior, Defense, Commerce, and Treasury and the Tariff Commission's chairman. The Secretary of State is omitted by design. Sen. Malone has borrowed a familiar pitch in Washington, considered his bill a defense measure not primarily related to foreign trade issues. The bill is a product of the Malone Mineral Subcommittee Hearings held in recent months. Rep. Bishop (R., Ill.), who represents a fluorspar district, has intro-

DMEA Projects and Contracts As Of Feb. 1, 1954

Commodity	Contracts in Force	Value of Contract	Government Loan
Antimony	5	$ 322,563	$ 241,922
Asbestos	6	88,044	79,240
Beryl-Mica	4	93,179	83,862
Cobalt-Nickel	5	1,240,880	892,616
Columbium-Tantalum	2	48,690	43,821
Copper	18	1,701,891	850,946
Fluorspar	5	207,279	108,641
Iron	3	556,800	278,400
Lead-Zinc	86	8,028,588	4,014,292
Lead-Zinc-Copper	24	3,924,013	1,962,006
Manganese	10	400,424	300,319
Mercury	14	837,144	627,858
Mica	45	333,031	299,728
Monazite	3	51,114	46,002
Platinum	1	12,000	10,800
Sulphur	1	99,150	49,576
Thorium	3	106,791	96,108
Tin	4	452,231	407,008
Tungsten	39	2,087,911	1,565,934
Uranium	31	810,272	792,248

Commodity	Certified Projects	Value of Reserves	Royalty Repayments
Antimony	1	—	—
Asbestos	2	—	—
Beryl-Mica	8	$ 723,530	$ 468
Cobalt-Nickel			
Columbium-Tantalum			
Copper	4	7,772,900	7,610
Fluorspar	2	—	—
Iron			
Lead-Zinc	31	5,809,600 (Lead) 19,852,600 (Zinc)	66,180
Lead-Zinc-Copper	3	(Included Above)	15,262
Manganese	2	—	—
Mercury	1	—	—
Mica	12	433,886	14,978
Monazite	2	—	—
Platinum			
Sulphur	1	—	—
Thorium			
Tin			
Tungsten	9	1,382,983	62,614
Uranium	10	891,264	9,466

duced a companion bill, H. R. 8289. Prospects for passage are just about nil.

The Mineral Policy Committee's recommendation on mineral exploration aid was quickly implemented. Nineteen minerals—including lead, zinc, fluorspar, cadmium, antimony, and mercury—have been restored to DMEA loan eligibility, and the Administration has decided to continue the program until at least June 30, 1955, when legislative authority for exploration aid expires. It had been expected that DMEA lending would be curtailed this June.

Decision to bolster the DMEA program stems from two factors: (1) As compensation for the Committee's inability to recommend other specific mining assistance programs, and (2) DMEA's own impressive record.

Under DMEA's program, ore reserves valued at $80.9-million have been developed on 89 projects where mineral discoveries have been certified. That's the net recovery value based on January 1951 prices. But it's still a "conservative evaluation" of the reserves.

According to latest figures, DMEA has granted 621 loans totaling $17.9-million; private funds of $11.6-million were to be invested in these exploration projects. Of these, 309 contracts were still in force with Government participation of $12.6-million and private shares worth $8.8-million.

The ratio of total dollars expended by the Government to the net recoverable value of ore found on the 89 certified projects alone is 1 to 44. Total exploration costs on these projects is $2.9 million, Government loans accounting for $1.8 million. Ore has been shipped on 86 projects, from which the Government has received royalty replayments of $200,331.

Three operators — copper, tungsten, and monazite—are constructing their own mills and dredges and are already stockpiling ore for mill feed. One lead-zinc producer has already repaid his DMEA loan, another and a beryl producer are about to do the same.

The tables show detailed figures on DMEA projects, and include "accessory" reserves developed incidental to the primary project commodity. For commodities with less than three certified discoveries, figures on net recoverable value of ore reserves developed and on royalty repayments are omitted. This is in accord with DMEA policy not to release data on individual projects. Several of the certified projects are for more than one commodity.

"Accessory" Reserves Developed

Cobalt	$ 642,200
Rutile	6,751,500
Ilmenite	3,693,000
Zircon	1,290,700
Feldspar	1,760,000
Talc	475,000
Vanadium	110,000
Gold	156,100
Silver	394,100

LABOR THIS MONTH

Alan E. Adams, McGraw-Hill Washington News Bureau

BUTTE ELECTION SETTLES WAR BETWEEN MINE UNIONS: The vote by Montana miners is of major significance to the entire mining industry. The victory—by almost two to one—of the left-wing Mine-Mill and Smelter Workers Union means the end of further challenges by the rival CIO Steelworkers in the foreseeable future.

The National Labor Relations Board election count—4,069 for Mine-Mill to 2,170 for the Steel Union—was a severe jolt for the CIO. It means Mine-Mill will keep its bargaining rights throughout Montana and Idaho, while continuing to represent miners in Arizona, New Mexico and Canada.

OTHER LEFT-WING UNIONS SKIDDING: The break-away of 20,000 members of the Electrical Workers Union (Ind.) was a severe jolt to the entire group of leftist unions kicked out of the CIO four years ago for following the Communist Party line. It signals a probable collapse of the union in the electrical industry; a new bargaining power for the CIO Electrical Union which took over the secessionists.

When the CIO expelled eleven unions for Communist influence, their membership rolls hovered around the 600,000 mark. Since then, defections by the members have cut this figure by more than half. The action in the electrical industry could mushroom these secessions—spelling eventual end to the left-wing labor group.

GOVERNMENT AND MANAGEMENT PRESS THE COMMUNIST BATTLE: Declining to wait for defeat of Communist union leaders by attrition, these forces are pushing for a Federal law that would quickly knock them out of power in the labor movement.

- The General Electric Co., which faces the left-wing electrical union across the bargaining table, urges Congress to pass legislation so that Communist-controlled unions can be ferretted out, then denied legal right to operate—"Unless the Communist leadership were first removed."
- Congress wants an effective law, but so far hasn't been able to find the key that would lock the door to Red unionists. Several Congressional Committees are tackling the problem, combining an investigation into the operations of these leftist unions with a study of a myriad of bills designed to outlaw their authority to bargain for the workers. (Union members, on the whole, are free of the Red taint—the proposals are aimed at the leadership.)
- The National Labor Relations Board keeps up its own anti-Red campaign by challenging the veracity of a non-Communist oath filed by MMSW Secretary-Treasurer Maurice Travis. If the challenge sticks (it is currently blocked in the courts by Mine-Mill appeal), the Board could keep his union off election ballots; prevent it from making unfair labor practice charges against employers in the mining industry.

CAMPAIGN OPENS FOR HIGHER MINE WAGES: Mine-Mill recently set its 1954 Canadian bargaining goal. The union wants a minimum pay hike of 15¢ an hour; a pension plan permitting members to retire at 60 with the benefits based on their best 10 years earnings; severance pay amounting to 5% of earnings during employment whether the employee is laid off or quits.

While MMSW drives for better contracts for its members in Canada, its officials are worried about the labor situation in United States mines. The concern is over growing unemployment in the industry. The union estimates that production at the Kennecott Copper Co. alone has been cut by 25%, and any extension of this production cutback throughout the copper industry could cause critical job losses.

Nevertheless, unions set ambitious contract aims in coming bargaining with Anaconda Copper Mining Co. The various labor groups negotiating with Anaconda management set six new demands including a "substantial" wage hike, a 35-hour week at 40 hours pay, improvement in holiday and vacation pay.

LATEST FEDERAL TOTALS ON MINE EMPLOYMENT: New Labor Department figures show an employment decline in the metal mining industry. The first report for 1954 reveals a drop of more than 1000 workers since December—to just under 98,000. Mining payrolls now total 4,000 less than a year ago.

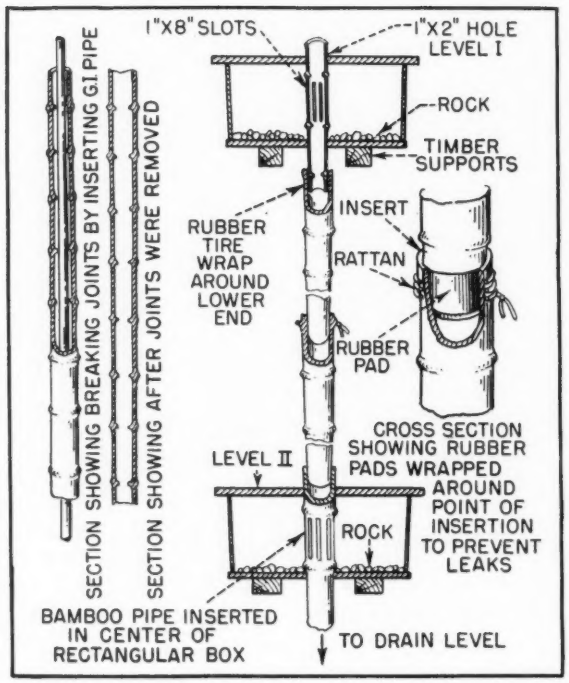
OPERATING IDEAS

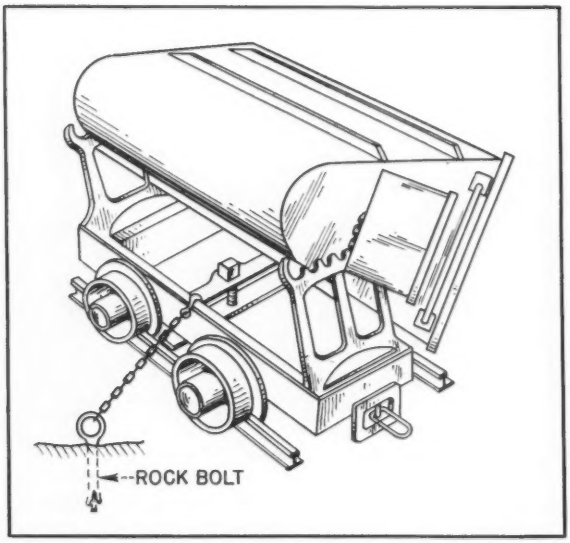
Bamboo Pipe Installed To Drain Acid Water

MINE WATER IN RAISES and shafts of the Nielson & Co.'s Hixbar mine, Philippine Islands, was so acid that it ate holes through galvanized iron pipe in less than three days. Lacking cheap acid-proof substitutes, the company installed bamboo sections as shown here to drain acid water from raises, shafts, and other working places. Since bamboo is abundant in the Philippines, an ample supply with wall thickness of ⅛ to ½ in., and joint spacing of 8 to 18 in. was readily available. Joint partitions are removed by punching them out with a length of iron pipe as shown. Lengths of 21 ft are commonly installed for drainage.

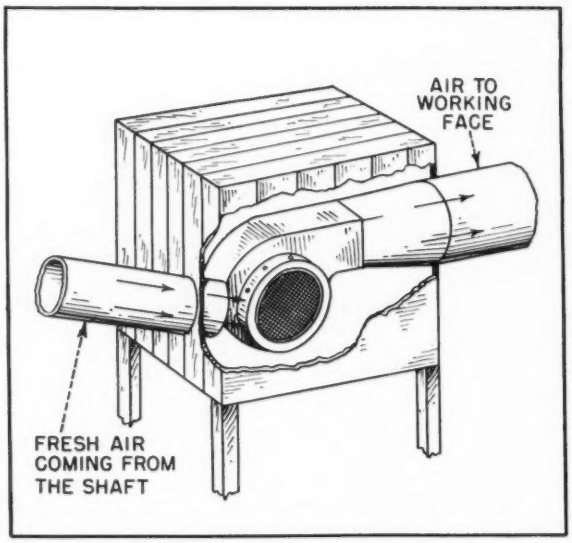
Two pipes are joined together as shown. The small end of one length is telescoped into the larger end of another section. A small piece of rubber inner tube is placed around the inserted end to effect a seal.

Wooden boxes, 1x2-ft in cross section are installed around the pipe at various drainage elevations. Slots cut in the pipe at the box positions permit acid waters to enter the bamboo pipe. This idea is submitted by Nestoriio N. Lim, Secretary of the Chamber of Mines of the Philippines. It also appeared in the *Mining Newsletter* of the Philippine Society of Mining, Metallurgical and Geological Engineers.


1"X8" SLOTS
1"X2" HOLE LEVEL I
ROCK
TIMBER SUPPORTS
INSERT
RATTAN
RUBBER PAD
RUBBER TIRE WRAP AROUND LOWER END
SECTION SHOWING BREAKING JOINTS BY INSERTING G.I. PIPE
SECTION SHOWING AFTER JOINTS WERE REMOVED
CROSS SECTION SHOWING RUBBER PADS WRAPPED AROUND POINT OF INSERTION TO PREVENT LEAKS
LEVEL II
ROCK
BAMBOO PIPE INSERTED IN CENTER OF RECTANGULAR BOX
TO DRAIN LEVEL



Chain keeps car out of the grizzly



Box helps relay fresh air to face

Two Useful Ideas from North Carolina

J. C. BUCK O'DONNELL, mine superintendent, Tungsten Mining Corp., Henderson, N.C., sends in these two useful ideas with full credit to E. H. Roberts, his mine foreman, who thought them up. The anchored chain and hook in the illustration at left was installed to prevent an occasional car of heavy muck from overturning and dropping onto the grizzly. A short rock bolt sunk below track level is adequate to hold the car.

The wooden box at right is a simple but effective enclosure enabling the transfer of fresh air from the exhaust of one fan pipe to a relay fan and pipe system leading to the face. The tight box gives great efficiency.

DORR Developments in the field of concentrated fertilizers:

THE DORRCO STRONG PHOSPHORIC ACID PROCESS . . . the first process successfully developed for producing a strong acid. In operation, it has conclusively proven that it will economically and reliably produce 32 to 33% P_2O_5 phosphoric acid with a single stage of filtration.

THE DORRCO FINES RECIRCULATION SYSTEM . . . produces a 100% granular product of exceptional uniformity. This is the only system which can be used interchangeably to produce triple superphosphate, ammonium phosphates, ammonium sulfate or complete granular concentrated products.

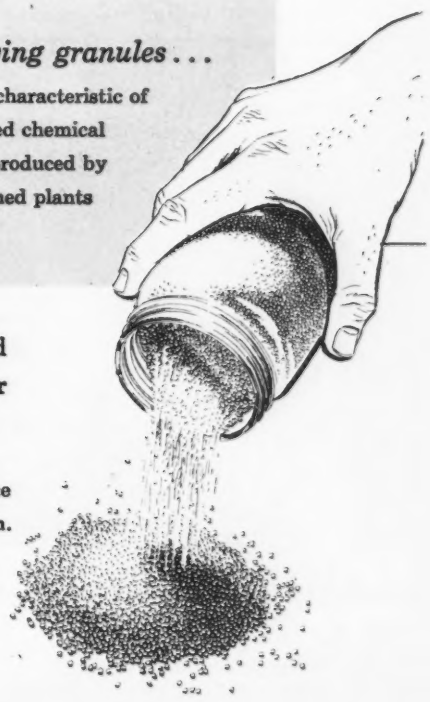
A CONTINUOUS METHOD of producing granular triple superphosphate with evaporation to only 38 to 39% P_2O_5, with no need for subsequent aging or curing of the product.

THE DORRCO SYSTEM of continuous vacuum evaporation which eliminates serious scaling, reduces P_2O_5 losses to a negligible point and involves no fume problem.

THE MANUFACTURE of ammonium sulfate from calcium sulfate obtained as a by-product of phosphoric acid production.

THE DORRCO FLUOSOLIDS SYSTEM... a new method for producing high strength SO_2 gas from pyrite and for the calcination of phosphate rock.

free-flowing granules . . .
important characteristic of concentrated chemical fertilizers produced by Dorr-designed plants

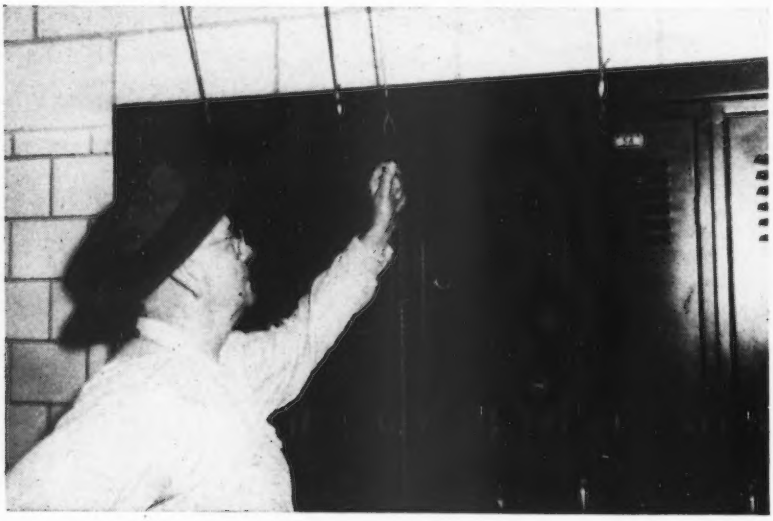


Dorr operates a complete consulting engineering service backed by 35 years of experience in the field of concentrated fertilizer production by the wet process.

Bulletin No. 8000 gives additional information about Dorr's experience and facilities in this field. Write to THE DORR COMPANY, Stamford, Conn.

Underground Fire Truck Is Prepared for Emergencies

TRACK - MOUNTED FIRE-FIGHTING equipment at the St. Joseph Lead Co. mining operations, Bonne Terre, Mo., is kept in readiness for any emergency. A 200-gal water tank feeds into an electrically operated centrifugal pump powered by cable from the trolley line. Other equipment on the truck includes an industrial first-aid cabinet, self-contained oxygen respirators (One is shown on a safety crew member), and an ample supply of water hose. Photo courtesy St. Joseph Lead Co., Safety Department.



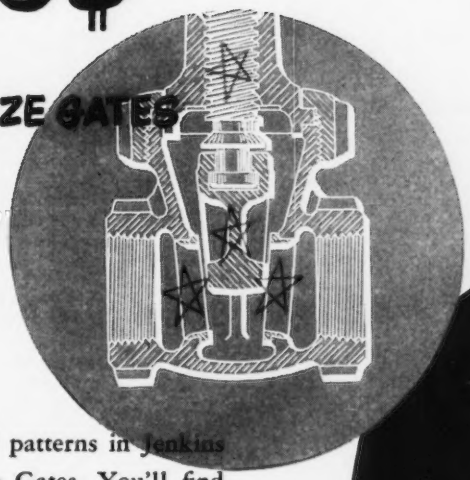
Locking Device for Change-Room Hangers

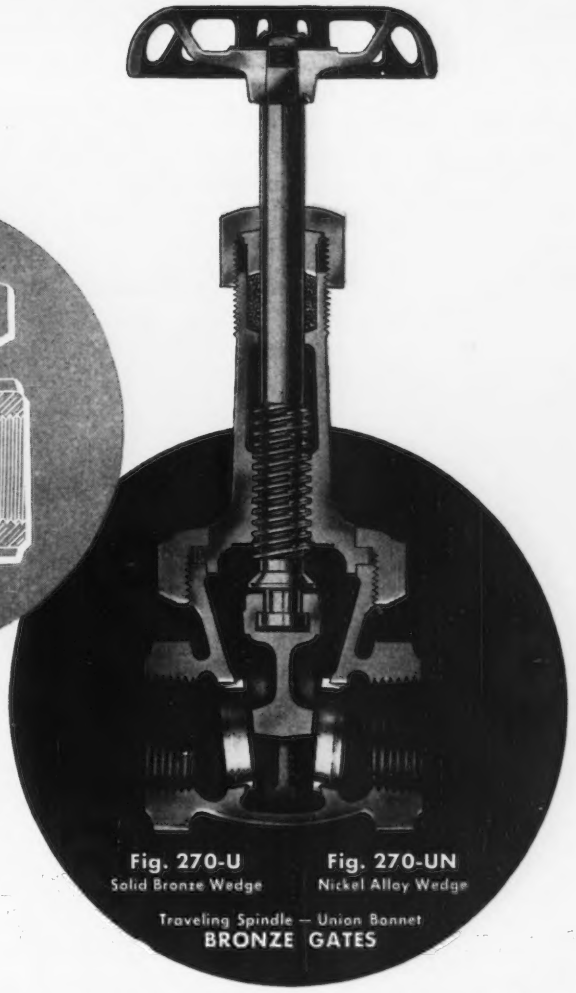
ONE OF THE UNIQUE FEATURES of the new change room at the St. Joseph Co.'s Indian Creek operations is the locking device attached to chain clothes hangers. C. Kremer Bain, consultant in charge of the Indian Creek project, points out a small metal clip which is attached to the hanger chains. This metal clip is bent to engage the top of the locker door. After the clothes hanger has been elevated to the top of the dry, the clip is attached to the door, and the locker closed and locked. This automatically locoks the clothes hanger chain also.

Mr. Bain is well know for his keen interest in community welfare. Accordingly after he decided to use clips, he contacted a local institute for the Blind to see if they could make them. The Institute not only accepted the job but also seggested some simplifications in the design whch were incorporated in the clip shown here.

Note also that the locker fronts are flush with the walls of the dry. This construction was planned deliberately to prevent dust, old socks, discarded tobacco tins, waste paper, etc., from accumulating on top of the lockers.

Built-in $AVING$ make JENKINS BRONZE GATES your BEST BUY



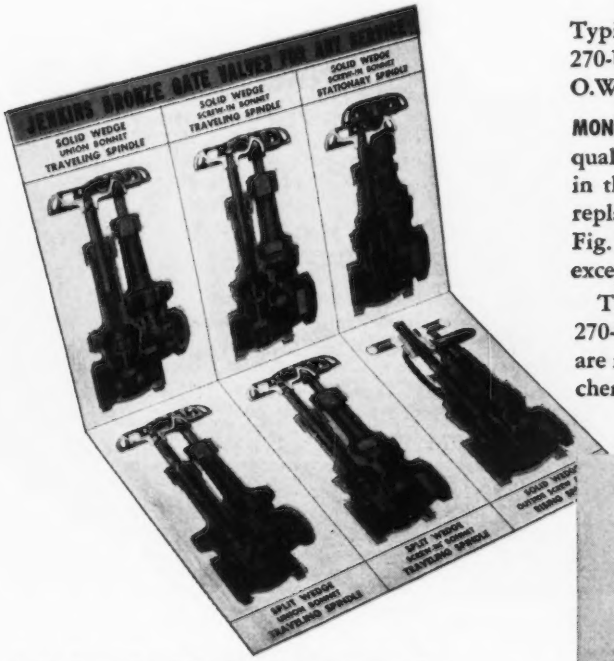


Look over any of the 35 patterns in Jenkins complete line of Bronze Gates. You'll find *savings* built into every valve. Jenkins valve specialists designed each one for easy maintenance and extra long wear. Try them on your toughest services and see why they take top-rating in any test for endurance and economy. Jenkins Bros., 100 Park Ave., New York 17.

Typical of Jenkins design for built-in savings are the Fig. 270-U and Fig. 270-UN Gates for 200 lb. Steam, 400 lb. O.W.G. services.

MONEL AND BRONZE SEATING COMBINATION In Fig. 270-U a high quality bronze wedge seats against MONEL rings expanded in the body. The wedge takes the wear — it can easily be replaced when necessary by slipping a new one on the stem. Fig. 270-UN, with a nickel alloy wedge, is recommended for exceptionally severe conditions of rapid wear and corrosion.

These and other features of rugged construction make Figs. 270-U and 270-UN first choice for economy where conditions are most destructive to valves, as in oil refineries, dye houses, chemical, food, and rubber plants.


JENKINS BRONZE GATE VALVES FOR ANY SERVICE
SOLID WEDGE UNION BONNET TRAVELING SPINDLE
SOLID WEDGE SCREW-IN BONNET TRAVELING SPINDLE
SOLID WEDGE SCREW-IN BONNET STATIONARY SPINDLE
SPLIT WEDGE UNION BONNET TRAVELING SPINDLE
SPLIT WEDGE SCREW-IN BONNET TRAVELING SPINDLE

Jenkins Bronze Gate folder shows the many types available — lists convincing reasons why they are your best buy for any service. Ask for Form 181-A.

JENKINS VALVES
LOOK FOR THE DIAMOND MARK
SINCE 1864
Jenkins Bros.

SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS

MARKETS—Trends and Prices (*Continued from page 69*)

Copper Deliveries Rise

THOUGH DELIVERIES OF COPPER to U. S. consumers have been substantially below the 1953 level, the industry was a little encouraged by the upturn that took place in February. Fabricators absorbed 87,384 tons of refined copper in the second month of the current year, against 77,091 tons in January and 117,204 in February a year ago.

Production at the mines is being curtailed, but most of the reduction in output is not expected to show up statistically until April. Output of crude primary copper averaged 2,477 tons a day during February, which compares with 2,481 tons a day in January. Crude secondary production has been shrinking because of active bidding for copper-bearing material by exporters who have been in a position to outbid the domestic buyers.

Stocks of refined copper in the U. S. have increased since the beginning of the year, whereas the foreign surplus has declined moderately.

A summary of Copper Institute's data for January and February, in tons, follows:

United States

Production:	Jan.	Feb.
Crude, primary	(a) 76,912	69,370
Crude, secondary	(a) 7,304	6,286
	(a) 84,216	75,656
Refined copper	111,553	103,496
Deliveries, refined	77,091	87,384
Stocks, refined	108,121	118,417

Outside United States

Production:	Jan.	Feb.
Crude, primary	(a)114,652	107,778
Crude, secondary	531	702
	(a)115,183	108,480
Refined copper	(a) 85,100	70,772
Deliveries, refined	(a) 91,941	76,001
Stocks, refined	280,510	275,372

(a)Revised.

Mercury Imports Heavy

IMPORTS in the Oct.-Dec. period and the year 1953, by countries, in flasks of 76-lb:

From:	Oct.-Dec.	Year 1953
Canada	28	172
Italy	22,565	37,827
Japan	25	25
Mexico	3,553	13,638
Netherlands	....	50
Peru	....	5
Spain	12,762	8,303
Yugoslavia	1,650	5,764
Totals	40,588	85,784

A summary of the 1952 and 1953 statistics, in flasks, follows:

	Year 1952	Year 1953
U. S. production	12,547	14,330
General imports	68,686	85,784
Exports	400	546
Consumption	42,556	52,400
Stocks at end:		
Consumers-dealers	33,700	25,700
Producers(a)	685	1,111
Average price	$199.10	$193.03

(a) Held by reporting companies.

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipments f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

Mar. 31, 1954

Aluminum ingot, 99 plus percent, lb.	21½¢.
Antimony, spot, lb., 5 tons and up but less than carload, packed in cases	31.97¢
Bismuth, ton lots, lb.	$2.25
Cadmium, commercial sticks, delivered, lb.	$1.70
Calcium, lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.18
Cobalt, 97 to 99 percent, per lb.	$2.60
Germanium, lb.	$295.00
Indium, troy oz.	$2.25
Lithium, lb., 98 percent	$11.00 @ $14.00
Nickel, cathodes, lb., f.o.b. Port Colborne (a)	60¢.
Magnesium, 99.8 percent, carloads, lb., producer's plant, Freeport, Texas	27¢.
Palladium, troy oz.	$21.00
Platinum (Official quotation wholesale lots) troy oz.	$84.00 @ $87.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$202.00 @ $204.00
Selenium, 99 plus percent, lb.	(b)$5.00 @ $6.00
Silicon, minimum 97 percent, carloads, lb.	18¢.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$12.50
Titanium, 99.3 plus, lb.	$5.00

(a) Includes U. S. duty. (b) Depending on quantity.

METALLIC ORES

Beryllium Ore, imported, 10% BeO, per unit	$46.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry	
44% Cr_2O_3 no ratio	$21.00 @ $22.00
48% Cr_2O_3 3 to 1 ratio	$44.00 @ $51.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$10.30
Mesabi bessemer	$10.05
Mesabi, non-bessemer	$9.90
Lead (Galena), 80 percent, Joplin, Mo., ton	$162.90
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties $1.02 @ $1.04 c.i.f. U. S. ports, duty extra. Long-term contract nominal at 85c. to 90c., c.i.f. duty extra.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	60¢.
Columbium-Tantalum, per lb., combined oxides	$3.40
Tungsten Ore, per unit of WO_3	
Foreign, 60 percent, c.i.f. U. S. ports, duty extra	$16.00 @ $18.00
Domestic, scheelite, 60 percent f.o.b. mill	$63.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	31¢.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	$54.00

(a) F.o.b. port of shipment.

METALLIC COMPOUNDS

Arsenous Oxide (arsenic trioxide) lb., in bbl. carload lots delivered	5½¢.
Cobalt Oxide, 72½% to 73½%, ceramic grade, per lb.	$1.96 @ $1.97½
Copper Sulphate, 100 lb.	$10.35
Germanium Oxide, lb.	$142.00

ALLOYS

Ferrochrome, 65 to 69 percent, per lb. of Cr contained	24¾¢.
Ferromanganese, 74–76%, net ton, seaboard	$200
Ferromolybdenum, 55 to 65 percent Mo. lb. of Mo. contained	$1.32
Ferrosilicon, 50 percent per lb. of contained Si	12.4¢.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$3.80
Ferrovanadium, per lb. of V delivered	$3.00 @ $3.25
Silicomanganese, Max. 1½ percent carbon, lb. per contracts	11.4¢.
Spiegeleisen, per long ton, 19 @ 21% grade	$86.00

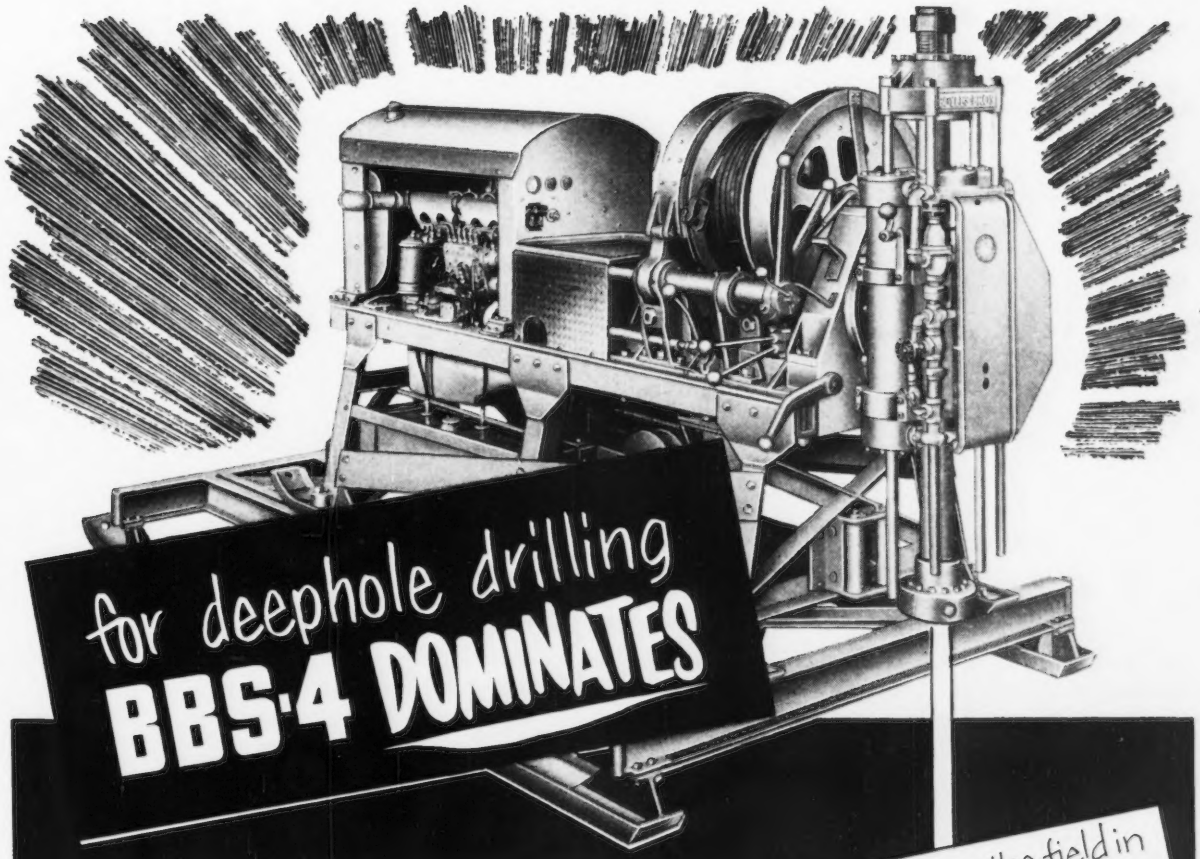
NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds) ton:	
Crude No. 1	$960 @ $1,500
Crude No. 2	$595 @ $900
Spinning fibers	$321 @ $514
Shingle fibers	$150 @ $200
Paper stock	$109 @ $137
Waste	$77
Shorts	$35 @ $70
Asbestos, f.o.b. Vancouver, B. C. (U. S. funds):	
Spinning fiber, 3-K	$460
Shingle fiber, 4-K	$185
Asbestos, Vermont, f.o.b. Hyde Park:	
Spinning fibers	$279.50 @ $302.00
Shingle stock	$135.00 @ $162.00
Paper stock	$81.50 @ $115.00
Waste, stucco or plaster	$71.40
Refuse or Shorts	$34.00 @ $63.00
Barytes f.o.b. cars:	
Georgia, crude, per ton	$14.00
Missouri, 94 percent $BaSO_4$, per short ton	$13.25
Bauxite, long ton, f.o.b. point of shipment:	
Domestic, crude, 50 to 52 percent (not dried)	(a) $5.00 @ $5.50
Domestic, chemical, 55 to 58 percent	(a) $8.50 @ $9.05
Domestic, abrasive, 80 to 84 percent	(a)$18.00 @ $18.50
Feldspar, bulk ton.	
Potash or soda feldspar, 200 mesh, ceramic grade	$18.50 @ $22.25
Glass feldspar, white, 20 mesh	$11.75 @ $12.50
Fluorspar, f.o.b. mines, bulk, 70% effective ton	$35.00 @ $37.00
60% effective CaF_2	$33.00
Acid 97% concentrate, bulk, ton	$55.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00 @ $14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$38.00
Mica—Domestic, f.o.b. mines. Punch 12 to 22¢. per lb. according to size and quality. Sheet clear, 1½ x 2 inch, 70¢. to 85¢.; 2 x 2 inch, $1.10 to $1.60; 2 x 3 inch, $1.50 @ $1.60; 3 x 3 inch, $1.80 @ $1.90; 3 x 4 inch, $2.20; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet, ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground: $32.50 @ $70.00 per ton Scrap $32 and up.	
Ocher, Georgia, ton, in sacks	$30.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	Not quoted
Sulphur, Texas, mines, long ton	$25.50 @ $27.50
Talc, f.o.b. works, ton:	
New York, purified	$18.50 @ $20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$30.00

(a) Normal.

IRON AND STEEL

Pig Iron, gross ton, basic, Valley Furnaces	$56.00
Steel f.o.b. Pittsburgh, billets, net ton	$62.00
Structural shapes, 100 lb.	$4.10 @ $4.15



for deephole drilling BBS-4 DOMINATES

CHECK THESE BBS.4 FEATURES:

Shown here with H size oil hydraulic swivelhead, (gear and friction feed swivelhead optional), this improved model BBS.4 surface drill is built as a single unit and drills at any angle to 5000 foot depths. Sub-base permits movement to and from hoisting position without altering swivelhead angle. Hoist operates forward or reverse in all 5 transmission speeds for lowering of drill string against engine braking power or fast return of hoisting plug. BBS.4 is also designed for rotary drilling with or without kelly drive. Standard power unit is 100 H.P. diesel. Bit speeds to 1500 R.P.M. Can be supplied with derrick for 30 or 40 foot pull.

NOTE THESE BBS.4 CAPACITIES:

BX (1⅝" Core — 2⅜"Hole) - -	5000 ft.
6" hole (Rotary) - - - - -	2000 ft.
Maximum Hoisting Speed -	800 ft. per min.
Cable drum capacity - -	300 ft. ¾" line
Weight without base - - - -	9300 lbs.
Weight of base - - - - -	1800 lbs.

...dominates the field in **VERSATILITY**

...in **SPEED**

...in **CONVENIENCE**

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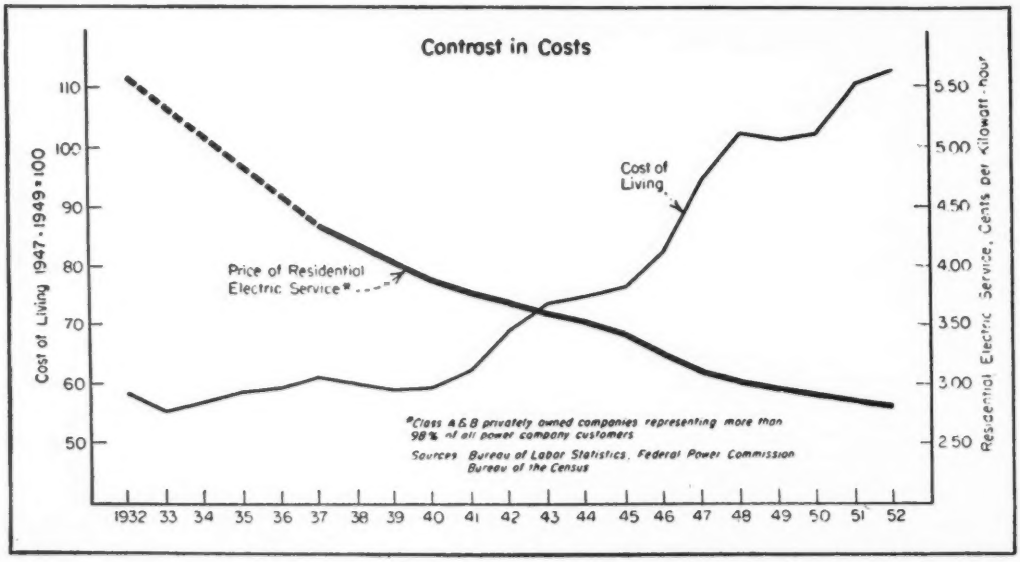
A 20-YEAR RECORD . . .

The Electric Power Companies' Case for Public Confidence

An economic study of the record of the investor-owned electric power companies of the United States over the past twenty years underwrites their claim to public confidence today. A key factor of this record is set forth by the chart in the middle of this page. This shows that while the cost of living as a whole has almost doubled, the average price of electric energy for residential use in the United States has been cut in half.



The average prices of industrial and commercial power also are much lower than they were twenty years ago.

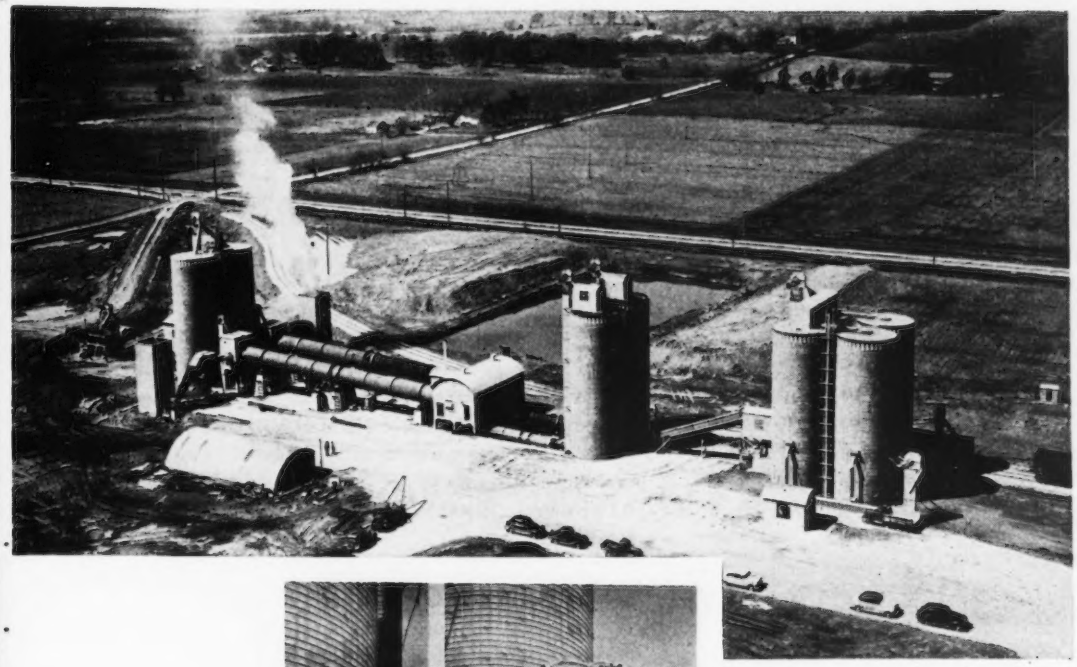
Such a study confirms the record on other key accomplishments of the electric power companies during the past two decades.

They have not failed, either in peace or war, to meet the nation's rapidly expanding electric power requirements. In paying tribute to the performance of these companies during World War II, J. A. Krug, Director of the Office of War Utilities, said, "Power has never been too little or too late." The same can be said for the entire period of the past twenty years.

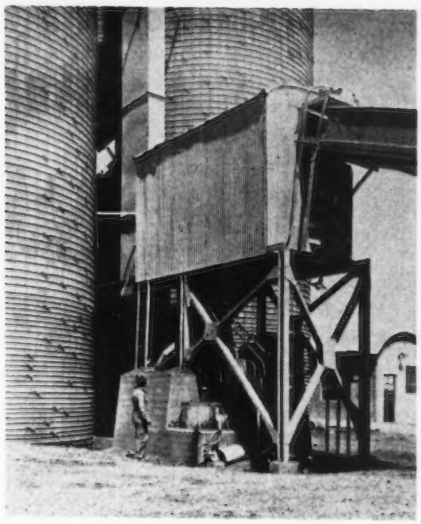
To be ready with enough power – on time – the electric power companies have expanded their production fourfold since 1933. This has required an investment of over $17 billion in new facilities. To raise the funds for this investment they have enlisted the participation of about 3 million direct stockholders. Through life insurance companies, banks and similar institutions, about 90 million Americans -- more than half of the nation's total population – have become investors in electric power companies. By thus relying on private investment for their expansion, the power companies have provided their

Kennedy Crushers Help Bondex, Inc. Produce More Expanded Shale Aggregates

Double Discharge KVS Crushers Double Aggregate Output



Bondex, Inc., new lightweight aggregate plant at Ottawa, Kansas. L to R—receiving hopper for raw material, storage silo, kilns, dust collectors, kiln firing room, cooler, conveyors and crushing house, finished material silos and loading stage.



Raw material crusher house for KVS Gyratory Crushers.

Bondex, Inc., Ottawa, Kansas, operate a new expanded shale aggregate plant, equipped with the most modern machinery for peak capacity production.

Screened raw materials are fed by conveyors to KVS Gyratory Crushers for primary and secondary stage pulverizing to aggregate size. This equipment was selected by Bondex as being the best suited to handle their shale crushing.

***All* KVS equipment is built to rigid specifications . . . all parts standardized for ease of replacement . . . maximum use and minimum maintenance are assured through precision workmanship and the use of specially hardened steel at all wearing points.**

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plant and operating equipment without burden on the taxpayer.

In addition, the investor-owned companies have paid about $12 billion in taxes to various governments – national, state and local – over the past twenty years. Unlike government-owned and -operated systems, they have received no public subsidies. When taxes and subsidies are taken into account, the rates for electricity charged by the investor-owned companies have been as low as, or lower than, those charged by government-owned and -operated systems.

Many Americans do not appreciate the job that the power companies have done over the past two decades. That is due, in part, to the public memory of financial abuses by some utility holding companies during the 1920's. This memory obscures a clear and unprejudiced view of the progress since those days. And some of the all-out advocates of reliance on government rather than on regulated private enterprise for the development of our power resources do their best to keep this memory of the past alive in the present.

An Impressive Case

Some special cases of electric power development may involve problems for which the investor-owned companies are unable to provide full solutions. This may be true, for example, of some large multiple-purpose projects that combine electric power generation with related developments such as the improvement of navigation, flood control and the irrigation of arid lands. Some of the economic and administrative problems imposed by such projects are not well adapted to effective handling by private enterprise. Flood control and the improvement of navigation, for example, usually involve the provision of much costly service over and above the cost of producing power.

It is true, however, that in some cases development of the electric power side of multiple-purpose projects by private enterprise may well be more feasible than would appear from statements by some government power advocates. And the record indicates that even in those projects on which both the power generation and the other services are handled by public authority, it may well be desirable to have the investor-owned companies assume the transmission and distribution functions.

Our study of the record of the investor-owned and -operated companies over the past twenty years has led us, of course, behind the statistics that bear on the wisdom of giving them a priority in the development of our power resources. It reveals that these enterprises are manned by people who, through lifetime experience, are peculiarly conversant with the needs of the communities they serve. They have given the consumer notably good service while conforming to standards set and enforced by public regulatory commissions. They have won the confidence of the investing public. By their nature and their experience they are competent to handle any power program that can be demonstrated to be economically sound.

The Paramount Public Interest

By their economic performance during the last twenty years, the electric power companies have earned the confidence of the public. By relying on these companies to meet its electric power requirements the public will fully protect its economic interest in ample and efficient service at fair prices.

That is where our study comes out. Our findings do not touch the political consideration that private operation of electric utilities under public regulation is a safeguard against further concentration of both political and economic power in a federal government that already commands too great a concentration. But if these findings make an economic case for preferring power development by tax-paying business as against power development by governmental agencies, they clear the way for an appeal to the paramount public interest in safeguarding our personal and political freedoms against the further encroachment of government.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

How Du Pont "BLASTING TEAM" improves hard-shooting iron-ore operations

1. Typical iron-ore bank in Northern Minnesota open-pit mine uses Du Pont "team" of "Nitramex," "Nitramon" Primer, Pelletol and MS Connectors to get maximum fragmentation.

2. Loading "Nitramex" No. 2, a Du Pont blasting agent designed for hard-shooting formations. It cannot be detonated by ordinary blasting caps, fire, friction or sudden shocks.

3. Lowering "Nitramon" Primer to detonate the charge. Both "Nitramon" and "Nitramex" are packed in waterproof cans and may be loaded far in advance of firing.

4. Pouring Du Pont Pelletol around main charge. These free-running blasting agents settle to bottom of hole, giving maximum energy. Use Pelletol No. 1 in wet holes, No. 2 in dry.

5. Adding MS Connectors (MS-9 or MS-17) to improve fragmentation and reduce vibration and backbreak. Safety is increased as no caps are needed until just before firing.

6. Well-broken ore speeds production. Graphic example of how this Du Pont "blasting team" improves efficiency, safety and economy in difficult blasting operations.

Ask the Du Pont technical representative in your area for complete information on each of the products that make up this dependable "blasting team." He will welcome the opportunity to be of help to you.

E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Room N-11502, Wilmington 98, Delaware.

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PERSONAL NEWS

Senior staff appointments at Consolidated Mining and Smelting Company of Canada recently included that of D. D. MORRIS (left) to administrative assistant; A. D. TURNBULL, (center) manager of the research and development division and T. H. WELDON (right), general superintendent, metallurgical division. The promotions became effective Jan. 15, 1954 according to R. D. Perry, general manager.

Frank Ayer, copper mining consultant of New York City, has been given one of the two Egleston Medal awards for 1954. This is Columbia University's highest award "for distinguished engineering achievement." Previous winners of the Egleston Medal include **Dr. Irving Langmuir, Major Edwin H. Armstrong,** and **Dr. John F. Thompson,** chairman of the board of International Nickel Co.

Leland B. Flint, president of Flint Distributing Co., Salt Lake City, Utah, was elected a director of the Kennecott Copper Corp. Feb. 23.

Howard W. Fitch, independent geologist for the last 10 years, is doing geophysical prospecting for uranium and other rare minerals in the Gold Butte Mining District, Clark County, Nev.

A. G. Robertson, superintendent of the Sullivan Concentrator, Kimberly, B.C., has been appointed superintendent of concentration for The Consolidated Mining and Smelting Co. and will be responsible for the technical direction of all other Cominco concentrators.

MAURICE F. DUFOUR has been elected assistant vice president of Freeport Sulphur Co. Mr. Dufour, who joined the company in 1933, has been manager of development since 1951.

O. A. Rockwell, vice president and general manager of the Calumet Division of Calumet and Hecla, Inc., has resigned to become director, vice president and general manager of the mining division of Eagle Picher Co. at Miami, Okla. Mr. Rockwell is succeeded as general manager of the Calumet Division by **A. S. Kromer.**

Jean Dufranc has resigned from the Societe des Mines de Zellidja, Bou Beker, French Morocco, where he was assistant general manager, and is now employed as manager of mining research at Bureau de Recherches Geologiques et Geophysiques, Paris. He was succeeded at Zellidja by **Jean Paulhac,** former general mine superintendent.

Francis Young, former assistant mine superintendent at Zellidja, has been appointed general manager, Societe Nord-Africaine du Plomb, at Bou Beker, French Morocco.

C. W. Allen, vice president, mining operations, Cleveland-Cliffs Iron Co., has announced the retirement, effective March 1, of **E. L. Derby,** chief geologist. Mr. Derby will continue with the firm on a consulting basis. Mr. Allen also announced the promotion of **S. W. Sundeen** to manager, ore development in Michigan and Minnesota; **Burton H. Boyum** to chief geologist, at Ishpeming; and **Gerald Anderson** from senior geologist to Michigan District geologist.

Victor P. Geffine has resigned as vice president of Canadian Javelin, which has some extensive iron ore concessions in Quebec and Labrador. He did not resign from Newfoundland & Labrador Corp., or Nalco. Mr. Geffine is a former vice president of Cleveland-Cliffs Iron Co.

W. F. Distler, former mine superintendent for Miami Copper at Miami, Ariz., is now assistant mine superintendent at Climax Molybdenum, Climax, Colo.

Proctor H. Avon, former chief engineer of the titanium research project of Monsanto Chemical Co. and National Research Corp., has been appointed director of engineering for Monsanto's organic chemicals division. He succeeds **Willis M. Cooper,** new director of engineering.

The London Institute of Metals has announced the award of its Platinum Medal for 1954 to **Leslie Aitchison,** and of the Rosenhain Medal to **Alan Howard Cottrell,** professor of physical metallurgy, University of Birmingham, England.

Dr. Adolph J. Lena has been appointed associate director of research at Allegheny Ludlum Steel Corp. He will be in charge of the physical metallurgy section of the research department.

Pedro Horna Moreno is in charge of Chojilla mine, International Mining Co., La Paz, Bolivia.

D. G. W. Rowe, former safety engineer at Noranda Mines, Ltd., has been appointed mine superintendent.

Keith O'Donnell has been appointed mine superintendent for Frontino Gold Mines, Ltd., Colombia, S.A.

Richard V. Wyman has resigned from the New Jersey Zinc Co. and is now chief geologist of Western Gold & Uranium, Inc., at the Silver Reef uranium mines, Leeds, Utah.

Arthur C. Wilby has retired as vice president of U. S. Steel Corp. in Chicago and has been succeeded by **Edward C. Logelin.**

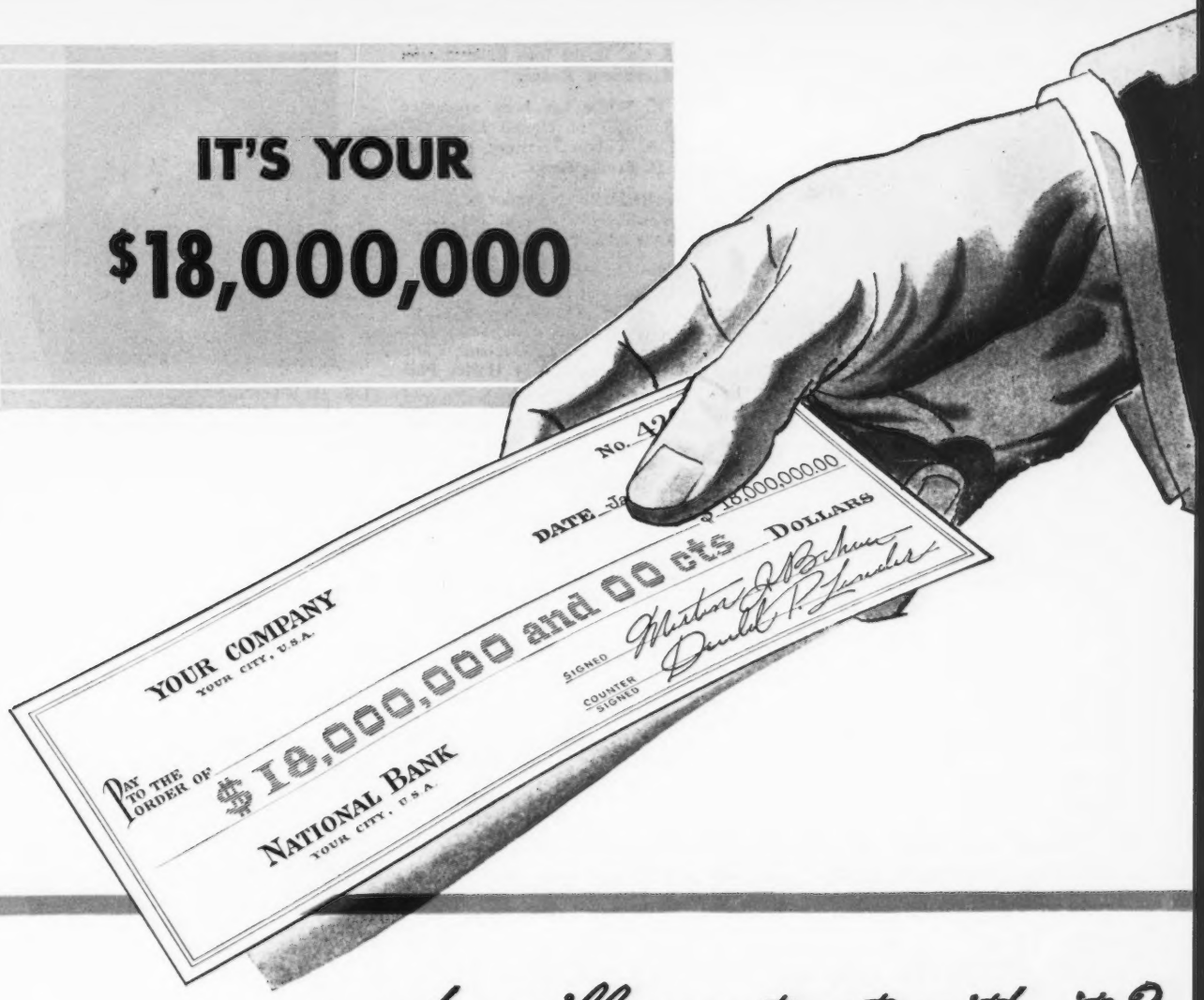
V. A. Gorsky, consulting engineer and metallurgist, has joined the geology department of the University of Natal, Durban, South Africa.

A. O. Schaefer, vice president of The Midvale Co., was named Delaware Valley Metals Man of the Year by the American Society for Metals.

(*Continued on p 114*)

WILLIAM B. HALL, Salt Lake City, has been named general manager of Vitro Uranium Co., division of Vitro Corporation of America. Mr. Hall joined Vitro in 1951.

IT'S YOUR $18,000,000



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DR. JERZY M. ZARZYCKI has been named technical adviser in photogrammetry and geodesy for Canadian Aero Service, Ltd. He will aid in Aero Service's topographic mapping and Shoran, and carry on research activities.

Robert R. Turner, former research metallurgist in the concentrator department of Noranda Mines, has joined the staff of Aerofall Mills, Ltd., as a metallurgical engineer.

Dr. H. R. Hanley, professor emeritus of metallurgical engineering at the University of Missouri, Rolla, is in Taiwan, Formosa, where he is organizing a department of nonferrous metallurgy at the University of Taiwan.

Robert G. Heers has been named manager of mining and raw materials for Kaiser Steel Corp., Fontana, Calif.

Walter H. Parker, professor of mining, emeritus, of the University of Minnesota, has purchased a winter home, and will make his future headquarters, in Phoenix, Ariz.

Jules La Prairie, mining engineer, is with St. Joseph Lead Co., Balmat, N.Y. Mr. La Prairie was formerly with Kennecott Copper Corp., Ruth, Nev.

Oliver A. Axelson, Caspian, Mich., has been named mining captain for Pickands, Mather & Co., in the Iron River district of the Menominee Range.

Clare E. White has been appointed general manager of United Keno Hill Mines, Ltd., Yukon Territory, Can. He succeeds **H. Brodie Hicks.**

A. T. Beckwith is senior engineer, George Koch Sons, Inc. at the Portsmouth Area AEC project.

H. S. Fowler, former general superintendent of fluorspar operations in Fallon, Nev., for Kaiser Aluminum and Chemical Corp., is now doing exploration work for the company out of Oakland, Calif. He has been succeeded by **Harley Phillips.**

Scott Turner, consulting mining engineer of New York, has been re-elected president of the American Institute of Consulting Engineers.

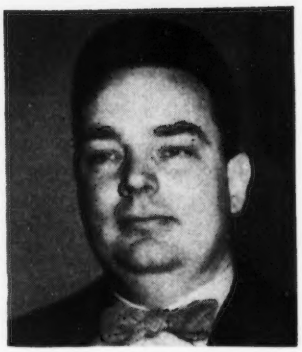
Clinton P. Mott has been named industrial engineer, Utah Copper Division, Kennecott Copper Corp. Prior to his promotion he was job evaluation engineer with the Utah Copper Division.

H. W. Hard, former metallurgist in the research laboratory of Hanna Coal & Iron Corp., Hibbing, Minn., is now chief chemist for the Hanna Nickel Smelting Co., Riddle, Ore.

E. A. Brown has been appointed chief of the Radioactivity division, Dept. of Mines and Technical Surveys, Ottawa, succeeding **Arvid Thunaes.** Dr. Brown has been with the department since 1947.

Lee R. Stoisier is with Kaiser Bauxite Co., Browns Town, Jamaica, B.W.I., in charge of exploration drilling and sampling.

Recent appointments and promotions at Hollinger Consolidated Gold Mines included: **J. W. Thomson** to the position of assistant to the controller; **William Burgess** to succeed Mr. Thomson as superintendent of the production engineering division; **R. St. Germain** to underground standards engineer; **Carson Farrel** to methods supervisor; **George Meredith** to plant engineering cost control staff; **Jack Tiffany,** former transportation supervisor, to plant services supervisor; and **Mike Steele,** former employee relations supervisor, to accident prevention supervisor, succeeding **Johnny Cooke.**



DR. HERBERT KELLOGG, of Columbia University, will take a sabbatical leave to serve as chairman of the Titanium Advisory Committee of the ODM in a full-time capacity, at the request of President Dwight D. Eisenhower.

J. Morrow Elias, former geologist with USGS at Grand Junction, Colo., is with the engineering department of Anaconda Copper Mining Co., at Butte, Mont.

William D. Haselton, Duluth, with Pickands, Mather & Co. since 1913, retired on Dec. 31, 1953. He will continue to live in Duluth.

George F. Becker, assistant electrical supervisor of the M. A. Hanna Co. operations in Minnesota, retired on Dec. 31. He began his employment with the Hanna Co. in 1921 in Michigan and came to Minnesota in 1925.

Gordon Sharbuck, chief grader, and **Raymond E. Bechtel,** chief chemist in the Canisteo district of Oliver Iron Mining Division, are in Venezuela at the Orinoco Mining Co. operations. They are expected to remain until next April.

The appointment of **Merlyn G. Woodle** as superintendent of Republic Steel Corp.'s Minnesota mines was announced on January 23 by district manager, **F. H. Cash,** Duluth.

R. T. Bell, superintendent at Pickands, Mather & Co.'s Bennett mine, has been appointed assistant to the general superintendent of the company's Hibbing district. **E. R. Tyler,** assistant superintendent at the Plymouth mine at Wakefield, Mich. succeeds Mr. Bell at the Bennett.

Pickands, Mather & Co. has announced the following appointments: **L. M. Becker,** superintendent of the West Hill mine has had the new Tioga mine added to his charge; **Arne Iehtinen,** engineer at the Wade mine, to be assistant superintendent at the West Hill mine; **R. Kirwin,** head foreman at the Tioga mine, to be assistant superintendent there.

Albert E. Hall, formerly manager of the abrasive and bond plants of the Nor-

Cheerful Group at start-up last November of nickel-copper-cobalt mill of Sherritt Gordon Mines, Ltd., Lynn Lake, Manitoba, includes: R. T. DRAKE (center), mill superintendent, who told the joke; HEATH HALES (left) general manager for Sherritt Gordon; and P. MALOZEMOFF, president of Newmont Mining Co., which has a substantial financial interest in the Lynn Lake project.

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ton Co., Worcester, Mass., retired from that position on Dec. 1, 1953 and is now doing consulting work.

E. W. Witcomb is a member of the consulting engineering staff of the Dorr Co., Stamford, Conn.

William Anderson Jr., of Tucson, is mine foreman for the Banner Mining Co., at the Mineral Hill mine, 15 mi south of Tucson.

Boris Ashurkoff has been named chief mechanical engineer, western operations, of the United States Smelting, Refining & Mining Co. At the same time, **Cyril Heiss** was named mechanical engineer for western operations of the company.

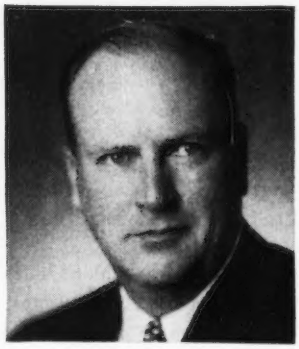
Paul T. Allsman, director of Region 5, Minneapolis, has been appointed director of the U.S. Bureau of Mines' Region 7, with headquarters in Knoxville, Tenn. He succeeds **Dr. Hewitt Wilson,** who died Nov. 25, 1952. **John R. Thoenen** has been serving as acting regional director.

Harold E. Rudd, mine superintendent at MacLeod-Cockshutt Gold Mines, has been promoted to mine manager, succeeding **J. M. Kilpatrick** who has left that company to become general manager of East Rim Nickel Mines, Ontario.

W. G. Jewitt, assistant general manager and manager of mines for Consolidated Mining & Smelting Company of Canada, has received the honorary degree of Doctor of Laws from the University of Alberta.

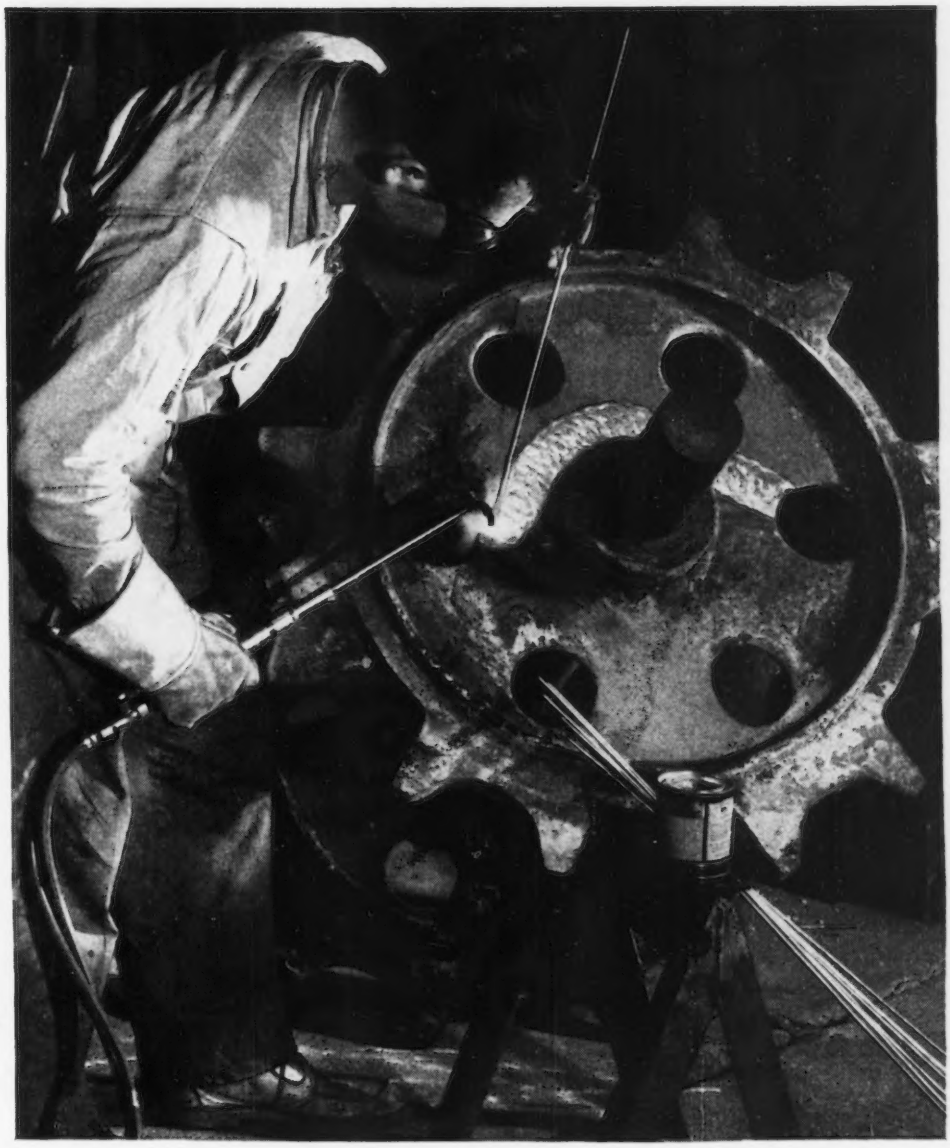
Dr. George Hanson, chief geologist of the Geological Survey, Dept. of Mines and Technical Surveys, Ottawa, has been appointed Director of the Survey to succeed **Dr. W. A. Bell** who, after many years as Director, has been appointed Chief Geological Consultant.

L. J. Severson, vice-president in charge of mineral development for the Oliver Iron Mining Division, has announced three new appointments: **R. Ward Grosz,** mining engineer in the Duluth headquarters office, has been appointed to the general office staff; **George T. Beardshear,** mining engineer in the Hibbing-



ANDREW ROBERTSON, former vice president and general manager of Barvue Mines, Ltd. and Golden Manitou Mines, Ltd., has been elected president and managing director of Eastern Smelting and Refining Co., Ltd., Quebec.

BRAZE WELDING



CONVEYOR DRIVE SPROCKET that was repaired by braze welding with ANACONDA-997 (Low Fuming) Bronze Rods in only 7 hours. Braze welds made with these rods are clean and strong . . . require little finishing.

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Owner Walter Shanowsky, Universal Welding Co., Rochester, N. Y., reports that ANACONDA-997 (Low-Fuming) Bronze Rod gave a fast, sound weld. These rods 'tin' readily, flow freely and have good tensile strength. They melt at relatively low temperatures . . . work requires less preheating, so danger of warping or cracking is minimized.

Universal buys all its ANACONDA Welding Rods from the Welding Supply Corp. in Rochester. ANACONDA Welding Rods for almost every type of repair and production job are available from distributors throughout the United States and Canada. For latest tips on welding, write for Publication B-13 to: *The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.* 53166

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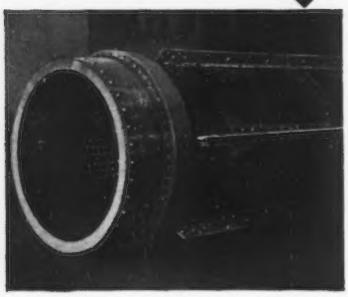

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Chisholm district, has been made supervisor of engineering in the district office at Hibbing; and **Robert R. Wallace,** mining engineer at the Sherman group of mines, has been appointed supervisor of engineering for that group.

E. F. Ziolkowski, mining engineer, has joined the engineering department of Pickands, Mather & Co. at Ironwood on the Gogebic range.

Eugene Carlson, mining engineer, formerly with the Montreal Mining Co., Montreal, Wis., is now a member of the Pickands, Mather & Co. staff at Ironwood, Mich.

ARTHUR C. LUNDAHL, newly elected president of the American Society of Photogrammetry, was installed at the group's meeting, held on Jan. 14 in Washington. Other officers are W. Sidney Park and Robert N. Colwell, first and second vice-presidents; C. Earl Palmer, secretary.

William A. Willis has been named superintendent of Virginia - Carolina Chemical Corp.'s new triple superphosphate unit near Nichols, Fla.

J. A. Littrell, former project engineer for the exploration division of the AEC, is now with Phelps Dodge Corp.'s operations department, New Cornelia branch, Ajo, Ariz.

V. E. Flaherty, administrative superintendent at the Trentwood rolling mill, east of Spokane, Wash., and **A. Dean Smith,** chief engineer of Kaiser's fabricating division, Oakland, Calif., are touring aluminum fabricating plants in Europe.

Wing G. Agnew, formerly with the Mt. Weather (Va.) experimental station, is now in Spokane, Wash., as chief of USBM's Northwest Mining division, succeeding **M. E. Volin.**

Mason Rankin, Helena (Mont.) consulting geologist, has been appointed mining geologist for the Union Pacific Railroad at Salt Lake City.

L. B. Manning, Philipsburg, Mont., manager of the Trout Mine of the American Machine & Metals, Inc., was elected chairman of the resolutions committee of the Mining Association of Montana, succeeding the late **W. R. Allen.**

New officers elected by the Nevada section of the AIME for the coming year are **John B. Zadra,** of the U. S. Bureau of Mines in Reno, chairman; **J. Ray Coulter,** of Coulter, Harden & Co. at Henderson, vice-chairman; and **Victor E. Kral,** of the Nevada Bureau of Mines at Reno, secretary-treasurer. Members of the executive committee include **Allison J. Gould,** of Anaconda Copper Mining Co., at Yerington; **Eldridge Nash,** of Nevada-Massachusetts Co., at Tungsten; **F. A. McGonigle,** of Manganese Inc., at Henderson; **Simeon W. Smith,** of Kennecott Copper Corp., at Ruth; and **S. Vernon Wines,** of Standard Slag Co., at Gabbs.

Robert W. Hughes, general manager, Miami Copper, has been appointed a director of the firm.

James H. Cazier, mining engineer with the Black Pearl Mining Co., Bagdad, Ariz., is new president of the Yavapai Council, Arizona Small Mine Operators Assn., **Arthur Still** is vice chairman and **Ernest E. Michael,** secretary-treasurer.

OBITUARIES

Oliver Hall, 74, one of the most widely known and respected figures in Canadian mining, died Feb. 15, in Toronto.

Louis J. Ensch, general director of Cia. Siderurgica Belgo-Mineira, Belo Horizonte, Brazil, died Sept. 9, 1953, in Luxembourg.

Eero Makinen, 67, managing director of Outokumpu Oy, Helsinki, Finland, died Oct. 27, 1953. He had been with the firm since 1921.

LeRoy G. Hetrick, district manager for the Denver Fire Clay Co., died Nov. 23, 1953.

Alfred W. G. Wilson, for many years chief of the mineral resources division of the Federal Department of Mines, of Canada, passed away Jan. 9 at the Ottawa Civic Hospital.

Clark H. McNaughton, 65, production manager for Tennessee Copper Co., died Feb. 19 at a Chattanooga hospital. Mr. McNaughton had been with the company for 35 years.

Francis Herbert Brownell, 86, chairman of the board of the American Smelting & Refining Co. from 1930 until his retirement in 1947, died March 8 in New York. Surviving are his widow, Josephine Noble Brownell; two sons, Kenneth C. Brownell, president of the American Smelting & Refining Co., and Francis H. Brownell, Jr.; and a sister, Mrs. Theron A. Noble.

Marvin I. Mathisen, of the Denver Equipment Co., died Jan. 18 at his home in Denver, Colo. Mr. Mathisen was associated with the Homestake Mining Co., Leads, S.D., from 1927 to 1948.

William O. P. Fullerton, former manager of the New York office of Denver Equipment Co., passed away Jan. 18, 1954, in Fort Collins, Colo., where he had resided since his retirement.

Neil E. Salsich, 70, vice president and director of the Jeffrey Mfg. Co., died suddenly on Feb. 2 in Bethlehem, Pa.

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YOU move more material—faster—at lower cost — with this Le Roi Transo 1½-yard Front-End Loader. It saves you money every minute it's working — and here's why:

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14-foot maximum dumping height and 3-foot reach let you spot loads quickly with pin-point accuracy over high truck tail-gates, bins, hoppers.

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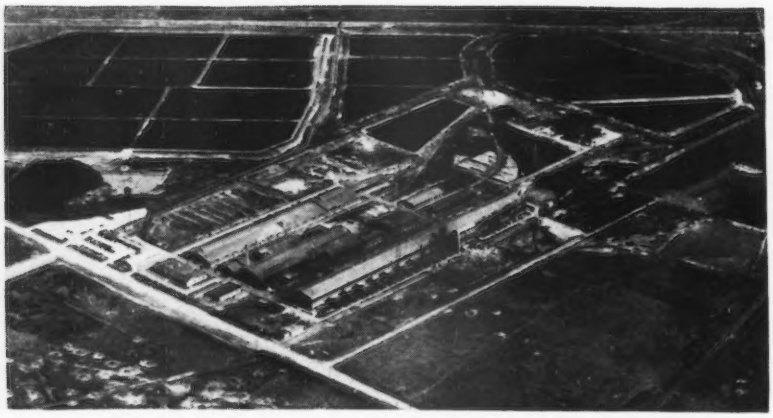
THIS MONTH IN MINING



WORLD'S LARGEST tin smelter seems to be headed for the mothballs.

Will the Texas City Tin Smelter Win An Eleventh-Hour Reprieve?

THE GOVERNMENT'S $11-million Texas City tin smelter, which has been in operation since 1942, seems doomed to close down later this year. But a fight is shaping up—spearheaded by Texas' Senator Lyndon Johnson, the minority leader, and Rep. Clark W. Thompson, in whose District the smelter is located—to keep the smelter going.

In its fiscal 1955 budget, the Administration sought no new funds to run the smelter, asked for $600,000 to close it down. The Administration reported that tin deliveries to the stockpile will end by July, and that "it is assumed that production will cease" at the same time for the smelter.

Johnson, Thompson, and others argue that there's authority to continue the smelter in operation two more years, that only Congress has the right to close it down. Johnson wants the Senate Armed Services Committee to investigate the situation before the smelter's operations cease.

No one in the Administration will lift a finger to keep the smelter operating, however. So, the final decision is up to Congress now. Congress has these alternatives: To (1) kill Public Law 125 of 1950, which renewed authority for the smelter's operation until June 30, 1956, or (2) vote new money for the plant's operation next year. The former is more likely.

The Texas City plant, managed by the Reconstruction Finance Corp., is the world's largest tin smelter. During wartime tin shortages, it produced metal for military use; during normal years, for the national stockpile. But with world supplies more than adequate to meet current needs, and the stockpile brimming over with a 40,000-ton tin surplus, the Administration sees little reason to keep the high-cost smelter in business any longer.

The smelter was built when World War II cut the United States off from European and Far East smelters, upon which this country was wholly dependent for its tin. In 1940, before construction even began, the Government signed a contract to buy about 18,000 tons of tin concentrates annually for five years from Bolivian producers other than Patino, whose production was tied up with British smelters.

The following year, a contract was made with the Tin Processing Corp., U. S. Subsidiary of N. V. Billiton Maatschappij, a Dutch metallurgical firm, to build and operate—at a fixed fee— a large tin plant at Texas City to smelt the Bolivian ores.

Original plan was for capacity of 18,000 tons annually. But the smelter was later built with capacity to produce 40,000 tons of tin metal annually, if only low-grade Bolivian ores were processed; 74,000 tons, mixing the low-grade concentrates with alluvial concentrates; or 90,000 tons if only high-grade alluvial concentrates were smelted.

Initial cost of the plant was $8-million. Postwar improvements and construction of a waste acid disposal plant brought total costs to date to approximately $11-million.

The smelter has never been able to obtain sufficient concentrates to operate near full capacity. Output in 1942 was 16,168 tons. Peak World War II production reached 43,500 tons in 1946. During fiscal 1953, tin production totalled 34,652 tons. In wartime, the smelter's production represented almost 75% of U. S. tin consumption; at other times roughly 60%.

The smelter has not sold any tin to industry since April 1953. RFC purchase commitments for tin ores and concentrates until that time were based on a selling price for metal of $1.215 per lb.

In addition to Bolivia, principal sources of tin concentrates for Texas City have been Indonesia, Thailand and the Belgian Congo. High-grade concentrates from the last three are mixed with the Bolivian concentrates to facilitate processing the South American concentrates. Relatively small amounts of high-grade ores have been available from Malaya and the Belgian Congo.

The U. S. is still committed to buy 8,000 tons of tin concentrates from Indonesia. If the smelter is closed before these are shipped, officials say the Indonesian concentrates could be treated at Malayan smelters before arrival in this country.

The Texas Congressmen advocate sale of the smelter to private interests. But most Washington officials pooh-pooh this proposal. They don't believe the plant could be run profitably as a private operation.

Some persons—mainly Malayan tin producers who have never been happy about the U. S. smelter—propose that the Texas City plant be converted into a super-duper Government metallurgical laboratory for research on titanium, zirconium, and other new metals. But this isn't being seriously considered in Washington. To do such work, the tin smelter would have to be completely reequipped.

Closure of the Texas smelter will be a bad blow to Bolivia, which has become increasingly dependent on the plant. Before World War II, exports of Bolivian tin ores and concentrates ran at about 25,000 tons annually—at least half from the now-nationalized Patino Mines. Patino ores were shipped to the Patino-controlled Liverpool smelter in England. The comparatively small tonnage from other mines was shipped to Dutch, German, and Belgian smelters.

The complexion of Bolivian tin mining has since changed. Of last year's 34,836 tons, roughly 12,000 tons were still mined in former Patino properties and smelted at Liverpool. Output from nationalized Hochschild and Aramayo Mines, which has expanded considerably since 1942, has been going to the RFC smelter.

With this smelter out of business, the Bolivians are scared stiff they will be forced to peddle the bigger tonnages of non-Patino ores to commercial European smelters, who they fear will drive tin prices even lower than they are now. Washington officials, however, think the Bolivians' fears are exaggerated. The Bolivians would like to see the Texas City smelter continued in operation for just another year or two. By that time they expect to be well along the road to diversifying their economy—mainly by expansion in oil.

Prospectors Reelect Viola MacMillan President; Optimism Is Keynote At Record Convention

ACCENT WAS ON "bullishness" at the 22nd Annual Prospectors and Developers Association Convention, which drew a record-breaking registration to Montreal's Royal York Hotel.

Mrs. MacMillan

As everyone knew it would, the Convention reelected Viola R. MacMillan as president. Mrs. MacMillan now begins her 11th consecutive year as Association president (see *E&MJ* Salute to Viola, September 1953, p 126).

An attendance of some 1500 persons filled scheduled sessions beyond rated capacity at the four-day meeting. The Convention opened March 7 with an informal welcoming address by P. T. Kelly, Minister of Mines, Ontario, and closed March 10 with a formal banquet and dance.

Banquet speaker, J. S. Proctor, general manager, Imperial Bank of Canada, traced the country's development in an entertaining talk on "The Prospector, the Banks and Canada."

Throughout the convention, enthusiasm rode particularly high on two topics: uranium generally and the recent developments in Ontario's Manitouwadge district.

Among those who spoke on uranium were Dr. Thomas E. Gillingham, chief physical exploration geologist, Atomic Energy Commission, New York, and Dr. David A. Keys, Atomic Energy of Canada, Ltd.

The Manitouwadge area was covered in a paper entitled simply, "Developments in Manitouwadge," given by Joseph Rankin, exploration engineer, Conwest Exploration Co. Rankin's paper had been prepared by W. S. Hargraft, exploration engineer, General Engineering Co.

Manitouwadge also provided the favorite topic at informal shop-talk sessions. Much of the buzzing centered around the rags-to-riches story of J. E. Forster, Roy Barker and William Dawidowich, all of Geraldton, Ont.

This trio, hardly more than "weekend prospectors" at the time, flew into the Manitouwadge Lake area last spring. They brought with them only a 1932 map showing existence of sulphides and, of course, every prospector's dream of "striking it rich."

Their discoveries have established large copper-zinc-silver orebodies and touched-off the heaviest staking rush in years.

At the Convention, Barker paid tribute to Hargraft, saying that it was Hargraft who recommended a drilling program after seeing the samples brought back by the trio.

Among other speakers at the Convention was Evan Just, vice president, Cyprus Mines Corp., who reviewed the outlook for base metals.

In addition to Mrs. MacMillan, other officers for the coming year include Cyril T. Young, vice president, and Fred Jowsey, secretary.

Decision Again Delayed On Aluminum Expansion

A DECISION on the third round expansion of primary aluminum production has again been postponed.

Office of Defense Mobilization indicated May 15 as the new date for submission of requirement estimates.

Defense Department has found a number of "undetermined factors" in connection with the amount of aluminum which aircraft manufacturers would receive. O.D.M. said this requires "a reworking of the entire military requirement for aluminum." The Air Force and the Navy have been ordered to immediately calculate requirements and report by May 15.

Late in November the Government had postponed the third round decision reportedly because it was felt the Defense Department had not sufficiently substantiated its estimates of requirements.

Three companies were considering entering the primary aluminum industry: Olin Industries, Wheland Co., and Harvey Aluminum Co., Torrance, Calif. The last is the only one that is going ahead with construction of an aluminum plant Reports are that it has let contracts for a plant at The Dalles, Ore.

Upgrade Southern Iron Ores

NATIONAL LEAD CO. and Republic Steel Corp. last month announced a joint project to upgrade southern iron ores. A large-scale pilot plant now is under construction at Republic's Spaulding iron ore mine near Birmingham, Ala. It will be in production this summer. The concentrate to be produced is expected to be sufficiently upgraded to warrant its use in modern blast furnaces.

Mining Calendar

Canadian Institute of Mining & Metallurgy, 56th annual general meeting, April 26-28, Sheraton-Mt. Royal Hotel, Montreal.

Pacific Northwest Metals & Minerals Conference, April 29-May 1, Multnomah Hotel, Portland, Ore.

New England AIME Regional Meeting, April 30-May 1, Bond Hotel, Hartford, Conn.

American Mining Congress Metal & Nonmetallic Mining Convention and Exposition, Sept. 20-24, Civic Auditorium, San Francisco, Calif.

News Highlights

Discovery of a vein yielding samples as high as 45% copper has been reported in Alaska. **Page 124.**

Polaris Mining Co. is pushing exploration work on a round-the-clock, 6-days-a-week basis. **Page 133.**

Lack of fluorspar orders is hitting miners hard in the Illinois-Kentucky district. **Page 136.**

A later-than-usual opening of shipping in the Iron County is expected this season. **Page 140.**

Bureau of Mines has announced plans to spend $789,000 of Federal funds in Nevada during fiscal 1955. **Page 142.**

GSA at North Carolina's Spruce Pine Depot resumed full-scale buying of mica March 15. **Page 144.**

Manganese mining on a large scale is being undertaken by the Colitz Mining Co. in Johnson County, Tennessee. **Page 145.**

A Spokane firm will provide ore milling service at mining properties on a contract basis. **Page 148.**

Work is underway on a $219,410 exploration project at the Holden, Washington, mine of Howe Sound Co. **Page 150.**

Quebec's newest base metal producer, Quebec Copper Corp., has placed its mill in operation. **Page 152.**

More than 70 companies now hold ground in Ontario's Manitouwadge District. **Page 156.**

Capacity of Inco's Creighton Mine concentrator has been increased from 10,000 tons to 12,000 tons a day. **Page 158.**

A milestone in the uranium history of Saskatchewan was provided during 1953 by Eldorado Mining & Refining Co. **Page 160.**

Running-in operations have begun at Randfontein Estate's giant uranium recovery plant. **Page 165.**

A salvage ship is recovering ingot copper from ships lost off the coast of southern Africa. **Page 166.**

Chile's bill providing a new deal for American copper companies is now being fiercely debated before that country's Congress. **Page 168.**

A manganese boom is underway in Mexico's Nochistlan District, Oaxaca. **Page 171.**

Iron ore sources have been confirmed on Puerto Rico's beaches and sand dunes. **Page 174.**

National Lead Co. announced that it has received concessions to explore a large area in northern Australia. **Page 176.**

Many branches of Soviet metal mining fell short of 1953 goals. **Page 181.**

Norway's biggest aluminum plant is to start production this month. **Page 184.**

Typical of the enthusiastic attendance at all sessions, both social and technical, is the crowd above, shown at the informal dance at the Hotel Statler. New records for participation and registration were set at the 176th annual meeting.

AIME's 176th Annual Meeting Breaks Records For Registration, Enthusiasm

URANIUM TREATMENT was the key subject at the 176th annual meeting of the American Institute of Mining & Metallurgical Engineers, held Feb. 14-18 at the Statler and McAlpin Hotels, New York City.

An informal survey of the record 3600 registrants who attended the four-day session gave the vote for "best paper presented" to Prof. F. A. Forward and J. Halpern, of the University of British Columbia, authors of "Treatment of Uranium Ores by Basic Pressure Leaching Methods."

Other sessions, among the more than 80 held, which came in for special commendation by the general membership were:

Session on "Education," held on the first day of the meeting, which included a discussion by leading mining men and educators on the need for closer liaison between industry and mining schools, to aid in turning out graduates who are fully qualified to take a place in the field;

Luncheon talk by Gordon Dean, former chairman of AEC, who asked for a "bold incentive program" for uranium mining, including an increase in depletion allowances from the present 15% to at least 27% and a moratorium to free uranium mining ventures from income taxes for at least three years;

Talks on uranium by C. J. Sullivan, currently of Toronto, and N. H. Fisher, of Australia, on the development of the Rum Jungle area uranium find and a second paper by Mr. Fisher describing the uranium strikes at Edith River;

"Steelmaking Processes—Some Future Prospects," by C. D. King, presented as this year's Howe Memorial Lecture. Mr. King, an assistant vice president of U. S. Steel, said in conclusion, "It is evident that the new pneumatic basic processes will be increasingly favored in the field of low-carbon steels and in conjunction with steel plants using other processes;"

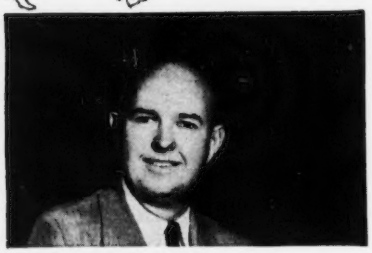
And numerous sessions on drilling, including one by Tel Ertl, Ohio State University, who offered the prediction that all drilling will eventually be done with rotary machines instead of percussion units.

Also notable were sessions on mine communications and drill-hole photography, as well as a much-discussed series of papers on geophysics.

At the annual banquet, also notable for its large attendance, Leo F. Reinartz was installed as president, 1954-55, of the AIME. Andrew Fletcher, retiring president of the organization, expressed gratitude for the cooperation of members and committee heads during his term and said he left "with regret" at the end of a very worthwhile year.

The record attendance at the presentation of each of the more than 400 papers given during the annual meeting was paralleled by the crowds which enjoyed all of the social events. More than 500 ladies were registered at the meeting. Highlights on the social side of the ledger were the annual banquet, the informal dance, the mining companies' cocktail party, the various division luncheons, and the traditional MBD Scotch Breakfast.

THE BOSTON MAN
IN 1954



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Norman J. Learned, LeValley-McLeod, Inc.

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* J. D. Craig, General Industrial Supply Corp., P. O. Box 243, Fort Worth (Phone Edison 9581) supplies Boston Products to Fort Worth and West Texas grain, flour, meat-packing firms. Known as "Your Friendly Distributor," he offers expert technical assistance and courteous service.

* Norman J. Learned, LeValley-McLeod, Inc., 215-221 E. Church St., Elmira (Phone Elmira 6166) serves central New York via branches in Schenectady, Olean, Binghamton, Syracuse—in addition to Elmira office. This 40-year-old company has supplied customers with Boston products since 1934.

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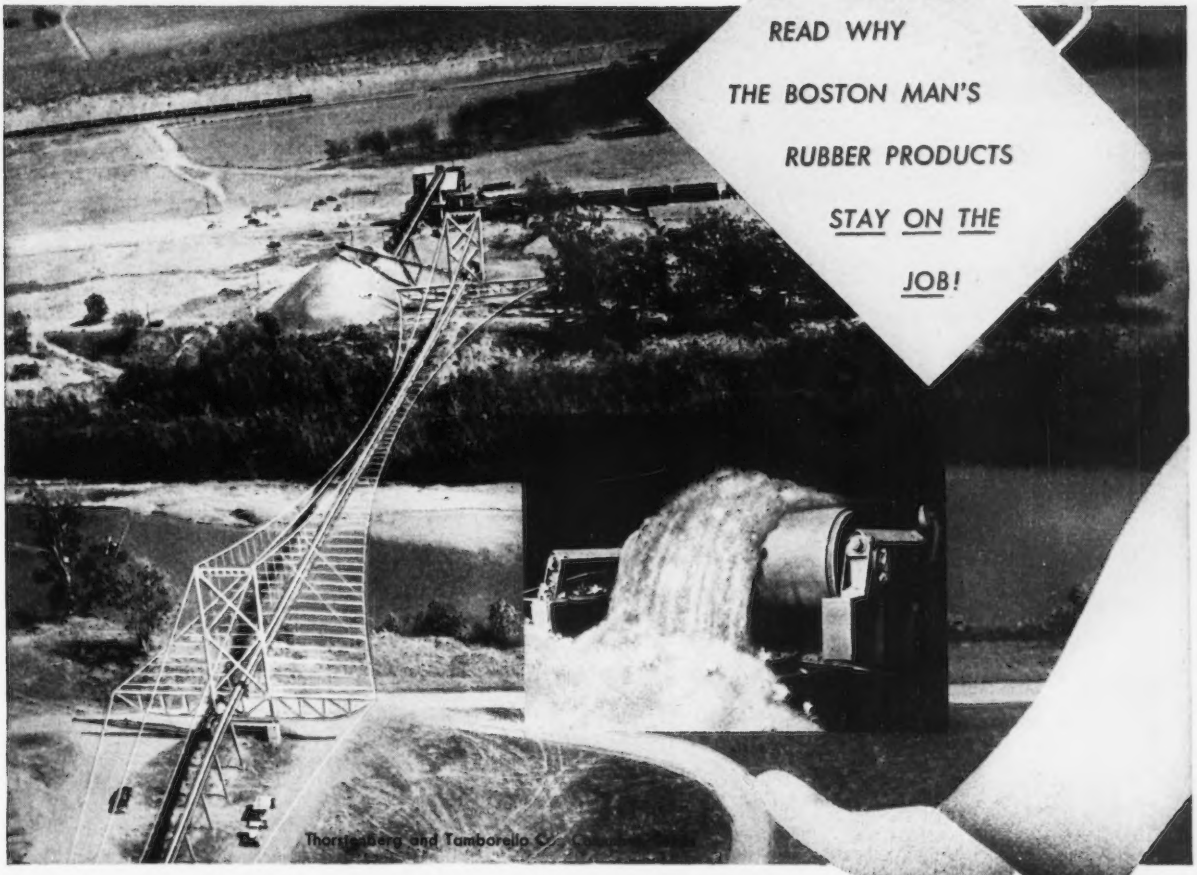

HOW OFTEN WOULD YOU SHUT DOWN AND REPAIR THIS CONVEYOR BELT?

At this Texas gravel deposit, a 1795-ft. Boston conveyor belt has moved 508 tons of coarse material per hour of operation during the last three and a half years. Yet work never halted for repairs on the belt! It looks and performs today like the day it was installed.

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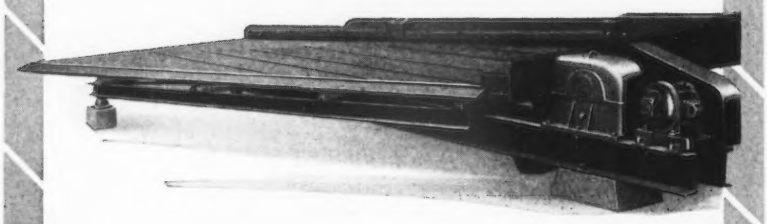
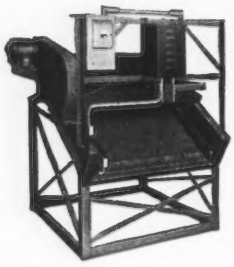


In the separation of minerals, the SuperDuty Diagonal Deck Concentrating Table easily excels in its treating range, any other table or process in common use today.

By combining the advantages inherent in the diagonal deck design with soundly engineered construction features, the SuperDuty produces exceptionally large tonnages of high grade concentrates, clean tailings and a reduced middling load for recirculation. For full information, ask for Bulletin 118-B.



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ALASKA

First load of about 300 tons of high grade lump chromite was to be sent by Seldovia Chrome Co. to the Government's Grants Pass, Ore., stockpile in February. Production is to be about 10 tons daily at the company's Red Mountain south east of Seldovia with peak capacity of 30 tons daily, expected by July.

According to Bill Lyons, president, the production goal for 1954 was set at 5,000 tons. He said the average from the mine is about 49.6% chromite. The present property, by addition of 4 claims recently purchased, brings the property to 180 acres. An airstrip 600 ft long and 60 ft wide has been bulldozed at the property and 5 employees have been provided with living quarters.

Bismuth is found in its native form near Nome, one of the few occurrences in North America. Native Bismuth Inc., at its property on Charley Creek, has continued exploratory work during the past two seasons. Nome Field Station and Assay Office, Territorial Department of Mines, have cooperated in mapping, assaying for bismuth, gold and silver and giving technical service.

A vein reported to have samples running as high as 45% copper has been discovered in the McClaren River district by John Pettijohn who has prospected in the Territory for 9 years. Eleven claims have been staked by Pettijohn and his partner E. O. Albertson.

The discovery is 12 mi from the proposed extension of the McKinley Park road. United States Geological Survey reportedly has analyzed samples from a 10½-ft wide vein finding high copper content and at present the USGS is preparing a detailed report on the discovery.

At Admiralty-Alaska Nickel Co.'s properties on Funter Bay, the orebody has been opened for 90 ft where Phil Holdsworth, Territorial Mines Commissioner, reported a "beautiful orebody." According to Norman C. Stines, engineer, values are even better than at a higher level.

The present crosscut being driven with DMEA funds has reached 670 ft. Drill holes are to be put down. A 2000-ton daily capacity mill and ore treating plant of hydro-metallurgical leaching type, a force of from 500 to 750 men and 6 or 7 years with plant expenditure of $40-million would be needed before production could be in full swing. Operator is Sam Pekovich.

ARIZONA

Atomic Energy Commission's search for uranium has brought about the first detailed survey of one of Arizona's most inaccessible regions—the Marble Canyon sector of the Grand Canyon.

A 20-man team operating three heli-

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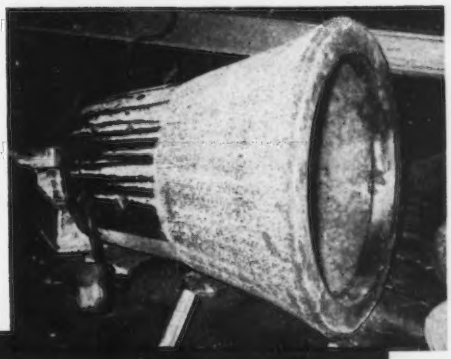

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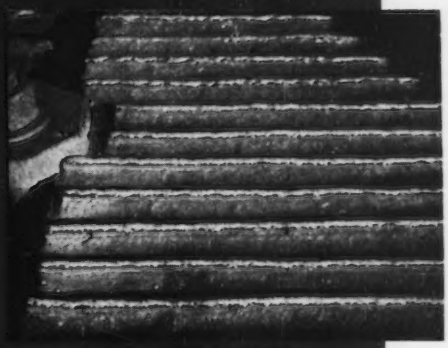

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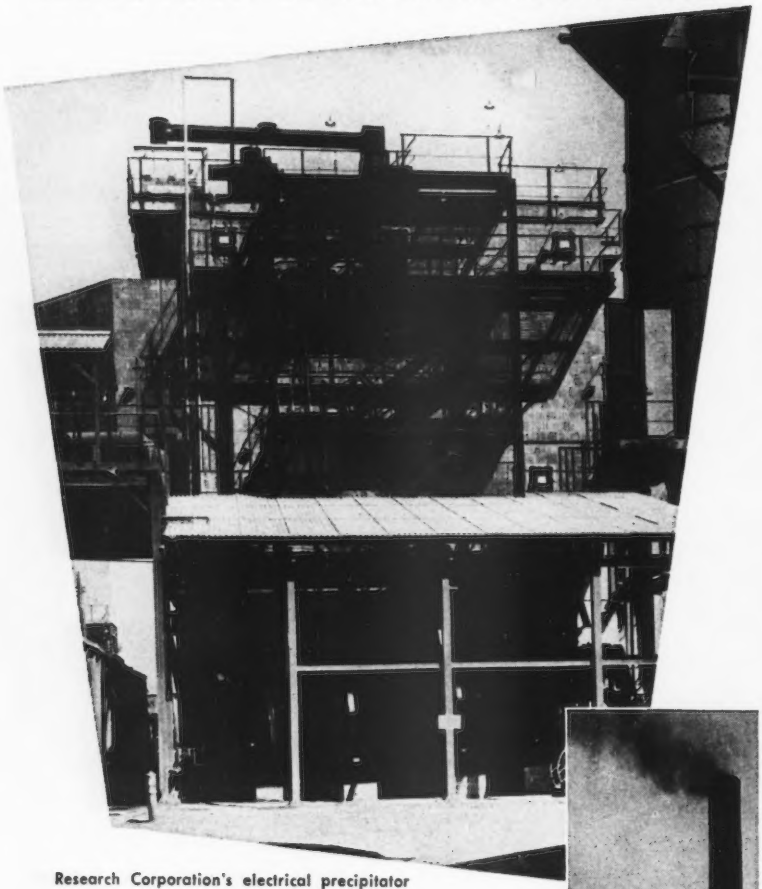
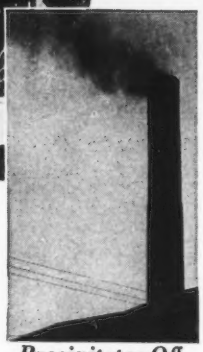
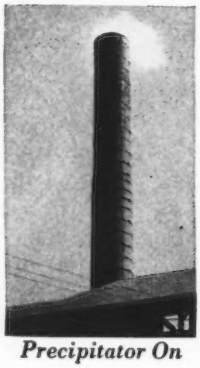


Research Corporation's electrical precipitator installation at the Palmerton, Pa. plant.



Precipitator Off



Precipitator On

The two photographs (right) show the results of this Research Corporation installation. The smoke in the picture at the top (Precipitator Off) consists of dry dust and fume entrained in the zinc ore sintering machine gases.

The picture at the bottom (Precipitator On) shows nothing but water vapor escaping from the same stack.

If you have a fume problem that involves recovering valuable materials that are going up the stack or combating a smoke nuisance, get in touch with your nearest Research Corporation representative. His experience with over 300 roaster and metallurgical precipitators will enable him to advise you on the most effective—and economical solution to your problem.

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Arizona *(Continued)*

copters spent more than a month on the project which covers more than 2000 sq mi, some of which never has come under the white man's knowledge.

Highly sensitive scintillometers were used on planes of the Kern Helicopter Service of Bakersfield, Calif.

In addition to providing data for the AEC, the recordings will be used by the Bureau of Reclamation in locating Glen Canyon Dam on the Colorado.

New mining corporations incorporated in Arizona include: Aquila Mining and Milling Corp., capitalized at $100,000 incorporated by W. M. Swisher, Scottsdale; J. E. Robinett of Aguila, and T. G. Browne, H. L. Long, C. J. Jaley, E. S. Kastner, R. H. Payne, and G. D. Rahn, all of Phoenix;

Utopia Mining and Development Co., capitalized at $250,000 by Russell A. Wright and Harrison C. Smith, Phoenix, and Ike W. Quartzsite, Wickenburg;

St. Anthony Mining Co., capitalized at $150,000 by Perry M. Ling, Mark Wilmer, and Nicholas H. Powell, all of Phoenix.

CALIFORNIA

Federal supply service of the San Francisco region, General Services Administration, has purchased 466,260 short ton units of tungsten concentrate since August 1951, a GSA spokesman revealed March 1.

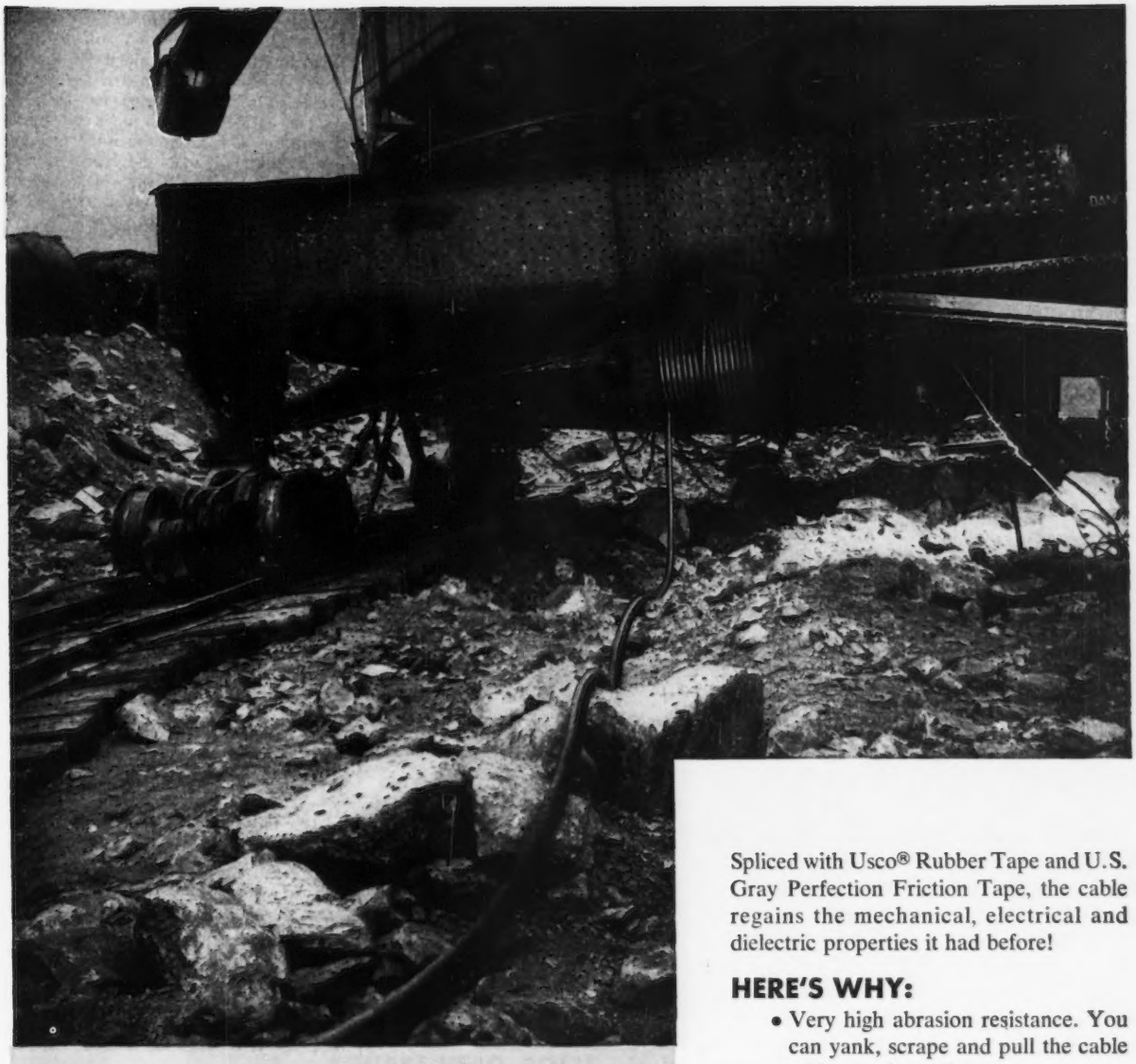
The top four suppliers are U. S. Vanadium, which has shipped 155,000 short ton units to the government from its Pine Creek, Calif., property; Getchell Mine, Reno, Nev., 86,000 short ton units; Nevada-Massachusetts, Sonora, Calif., 38,000 short ton units from its Tungsten, Nev., property, and Kennametal Corp., Fallon, Nev., 31,500 units.

The San Francisco region is the heaviest tungsten buyer of the 10 GSA regions, purchasing (in California, Nevada and Arizona) 65% of the total amount of tungsten bought by the government from domestic sources. Other important tungsten buyers are GSA regional offices in Denver, Seattle and Atlanta.

Since it started buying tungsten in 1951, the San Francisco office has issued 2336 certificates. Of that number, only 57 actually are shipping to the depot. Some of them, like Milton Gee of Fresno, E. Fernstrom of Tucson and C. W. Jones of Bishop, Calif, are ore buyers.

Other active shippers include Bradley Mining Co., San Francisco; Gabbs Exploration Co., Gabbs, Nev.; Nevada Tungsten Corp., Mina, Nev.; Surcease Mining Co., Sacramento; Wolfram Mining Co., Lovelock, Colo.; Tulare County Tungsten Mines, Lindsay, Calif., and Metallurgical Development Co. and Nevada Pacific Development Corp., both of Gabbs.

Garnet Hill tungsten mine operators report a scheelite occurrence in a north-trending tactite vein that varies from 15 to 50 ft in width and is about 150 ft long. Small amounts of molybdenite and



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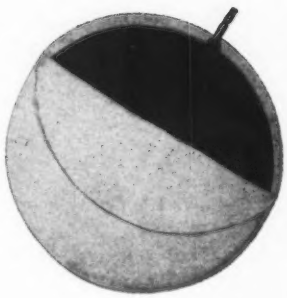

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California *(Continued)*

chalcopyrite are contained in the ore. East of the main vein are two smaller veins of scheelite-bearing tactite.

The property is an open pit mining operation. Ore from the mine, which is on Garnet Hill near the North Fork of the Mokelumne River in Calaveras County, is processed at a mill 60 mi away, near El Dorado.

COLORADO

Pride mill at Silverton has closed down due, it is said, to lack of ore. The mill is capable of treating better than 125 tons per day. Officials predict resumption of operations as soon as sufficient ore can be supplied to keep the mill running without interruption. The plant, one of the newest and most modern in the area, has been treating lead and zinc ore since its completion nearly 14 years ago.

W. F. Kelsey reports that a big mining venture is in prospect in Montezuma. Kelsey in association with the Burke-Martin Mines plans development of several locations in the district. Initial plans call for the reopening and development of the Silver Wing Tunnel.

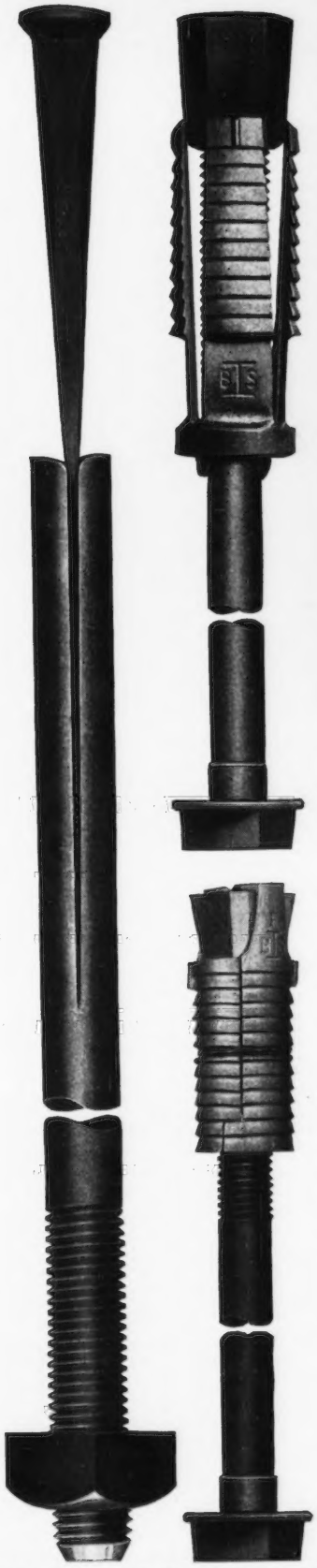
Carlton mill of Golden Cycle Corp. at Cripple Creek recently poured two gold ingots that show a value of $77,000. This pour of bricks numbered 166 and 167, brings the total approximate production of the mill since March 1951 to $4.1-million. Cleanup is still in process on the 3100 level of the Golden Cycle's Ajax in preparation to driving the lateral to the Cresson. There is considerable work yet to be done before actual driving can be started.

A new operation at Cripple Creek has opened work on the Anaconda Tunnel. The Sky Leasing Co., comprising Scott, Yarbrough and King, have taken a lease on property through the tunnel.

Zella Mining Co. Inc., Albuquerque firm, reported it had found uranium deposits on a 160-acre claim 7 mi west of Uravan in Montrose County. Joseph B. Zucht of Albuquerque says tests on the claim indicated several thousand tons of good grade uranium ore.

Layoff of about 200 lead-zinc workers at the Telluride Mines Inc. property near Telluride was posted by John S. Wise, general manager of the Idarado Mining Co., which owns the Telluride mine. Idarado is a Newmont subsidiary. Wise later said about 200 of the mine's 250 workers have been laid off due to the depressed price of lead and zinc.

A rich new strike in the Lake San Cristobal area is announced by three mining men from Lake City who have spent the last six months tracing down the Ilma vein of the old Black Crook properties. "We have exposed about 100 ft of vein that averages more than 4 ft wide," Frank Mendenhall told the reporter. "It's a good milling proposition



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"I've been around mines a long time, and I've seen many improvements over the years. But the one that really strikes me is these roof bolts. Now take this mine. We're using roof bolts in all new workings. It cuts down our accident rate, and gives us more room for mechanized equipment. I'm sold on 'em."

In many mines, operators are obtaining increased production and promoting greater safety for workers by using roof bolts in entries and air courses. This method of roof control eliminates the need for space-consuming timber supports, and improves ventilation.

To enable operators to obtain these desirable conditions, Bethlehem produces two types of roof bolts and shells:

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The ⅝-in. square-head bolt, recently developed by Bethlehem, is a high-strength bolt, with the same physical characteristics as the ¾-in. bolt. The bolt is furnished without ears, and is recommended for use with Bethlehem's new Type "F" shell. The shell, consisting of two pieces held in place by a wire spring, expands uniformly along its entire length. It has a maximum expansion of 1⅞ in.

The ¾-in. square-head bolt, furnished with an expansion shell, is for use in a 1⅜-in. hole. It has rolled threads and an unchamfered head. Pressed ears on shank support the Type "C" shell during anchoring. When bolt is tightened, the leaves of shell expand, locking against sides of hole. Bolt can also be used with Type "F" shell.

SLOTTED BOLT — This 1-in. bolt has a centered, forged slot. No metal is removed by slotting. The other end of bolt has 5 in. of 1-in. rolled threads. When driven in 1¼-in. hole, the wedge is forced into slot, expanding bolt-end. Truncated-cone point prevents thread damage. Fitted with American Standard Regular Square Nut.

Bethlehem Roof Bolts come in lengths of from 2 ft to 8 ft, and can be installed vertically or at angles. For full details, write to us at Bethlehem, Pa.

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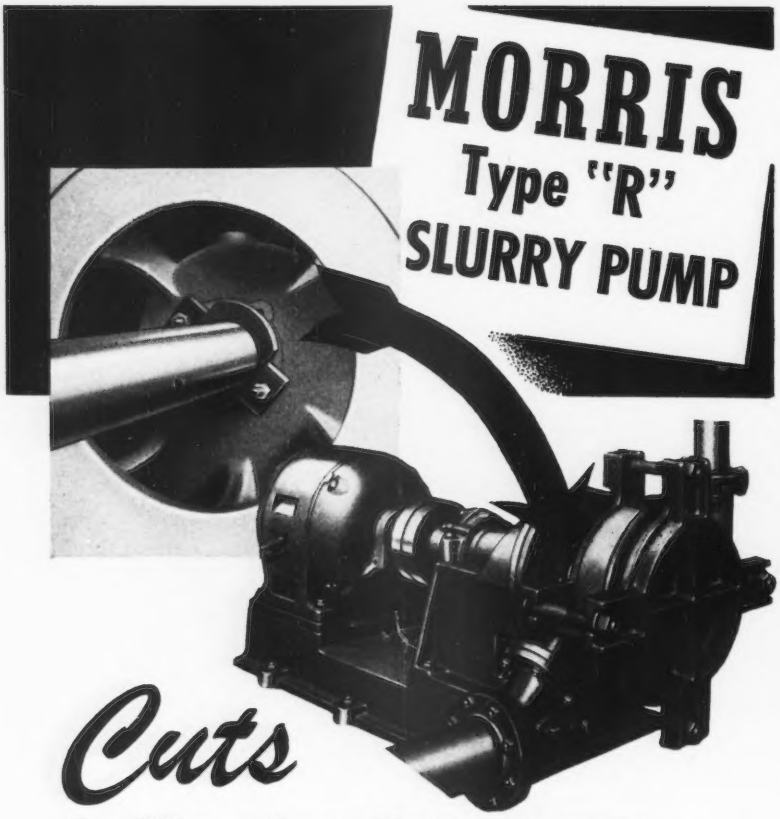

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Colorado *(Continued)*

and good enough to be a paying proposition at even today's unfavorable gold, lead and zinc prices." Associated with Mendenhall in the partnership are Joel Swank and Dr. Merritt Tomlinson of Lake City.

AEC says in its latest report that uranium ore is being produced from 525 mines, mostly on the Colorado Plateau, with principal production coming from the Morrison and Shinarump formations and more recently from the Chinle, Entrada and Todilto formations. In South Dakota and Wyoming, the Dakota formation has been the principal source of ore production. Some production is also coming from fissure veins in the Marysvale, Utah, district, the Colorado Front Range and the Boulder Batholith area near Boulder, Mont.

Lilly Belle Mining & Milling Corp. has done much in the way of development of its tungsten operation on the Old Faithful Claim in southern Gunnison County. An incline down 120 ft makes possible mining of 4% powdered tungsten ore for the 50-ton mill expected to be built this year, according to Ed Douglas, head geologist. The corporation is owned by many persons of small income in Colorado Springs.

E. L. Brown & Co., has reopened the Ibex Mine on Jonny Hill at Leadville. The No. 2 shaft, which had been closed since 1949, is the scene of this work. The Ibex is well known as a producer of high grade gold ore. The new company is seeking oxide gold ore.

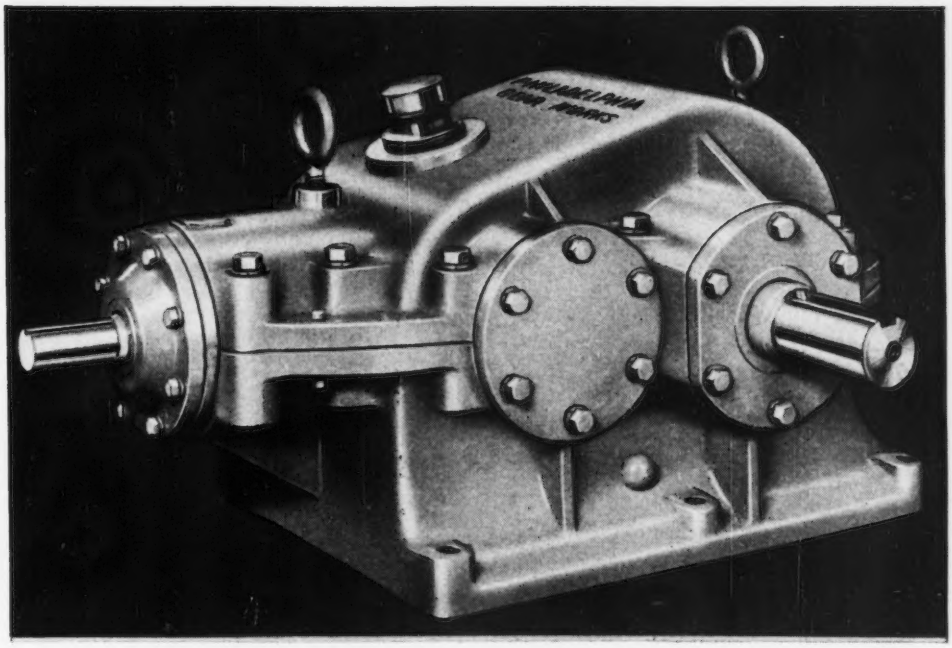
King Lease on the Camp Bird Mine near Ouray last year operated at an increased rate, despite low metal prices. The 140-ton mill makes lead and zinc concentrates, both containing gold, silver and copper.

IDAHO

A coalition of six Kellogg mining firms have embarked upon a uranium exploration and development in the booming Big Indian District of San Juan County, Utah, as a means of countering the current slump in their primary field, lead-zinc mining. The six companies are Silver Bowl Inc., Nancy Lee Mines Inc., New Era Mines Inc., Coeur d'Alene Silver Giant Inc., Signal Mining Co., and Caledonia Silver-Lead Mining Co.

Centrida Mines, Inc. has been granted 50% federal financial aid for a $63,140 DMEA project at the old Pope-Shenon Mine in Lemhi County, near Salmon. The contract approved by the DMEA provides for extensive tunneling and diamond drilling on the 500 and 600 levels of old workings to probe for ore extensions and parallel structures in the vicinity of mined-out ore shoots.

Sunshine Mining Co.'s 3400-level west drift on the Yankee Girl vein in Metropolitan Mines Corp. ground in the silver belt of the Coeur d'Alene District has



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Idaho *(Continued)*

opened approximately 50 ft of commercial silver ore directly beneath the "87" stope which yielded a substantial tonnage of rich ore from about the 3100-level. The drift face was extended to the west boundary of Metropolitan property and a new crosscut on the 3400-level has been started to open the projected downward extension of the "80" stoping area.

Polaris Mining Co. is pushing its East exploration project, from the 3000-level of the Silver Summit shaft into easterly adjoining properties, on a round-the-clock basis six days a week, with the monthly advance averaging about 390 ft.

Well over half of the 3000 feet to the first exploration objective has been completed. The first objective is the downward projection of the zone in which Coeur d'Alene Corp. found a small amount of commercial ore and a considerable amount of encouraging mineralization on its 2800 level

A ventilation raise will be run in this area to connect with the Coeur d'Alene Mines' workings and the exploration tunnel will then be continued easterly through American Silver and Silver Standard property and into Rainbow Mining and Milling Co. ground.

Entire project, which involves some 10,000 ft of drift work and 15,000 ft of diamond drilling from the drift, is being done under a $685,955 contract with DMEA.

The $229,500 deep-level exploration project which Silver Buckle Mining Co. of Wallace and New Park Mining Co. of Salt Lake City have undertaken at the Vindicator Silver-Lead property in the Coeur d'Alene District east of Mullan, with the aid of a 50% DMEA loan, is now progressing on a three-shift basis. Cutting of a station for the shaft work has been completed and excavation of a sheave-raise is underway. Sinking to a depth of 800 ft will be the next order of business to permit exploration of the Vindicator vein at an horizon which has proved productive in the near-by Lucky Friday Mine.

Practically all production from the Highland-Surprise Consolidated Mining Co. property on Pine Creek in the Coeur d'Alene District is now coming from leasers operating under the incentive block-leasing plan. Twenty miners included under the plan are turning out approximately 1500 tons of good grade ore per month, officials report. Some reopened old stopes are said to be yielding real high-grade, averaging 30 to 32% combined lead and zinc. It is believed to have been left by early-day operators of the property because of its high zinc content.

State Bureau of Mines and Geology reports that prospects appear excellent for developing a good tungsten mine in the Cuprum area of Hells Canyon on Snake River.

Lucky Friday Silver-Lead Mines has suspended development work on its new 2300-ft level temporarily to concentrate on pushing to completion the shaft-raise

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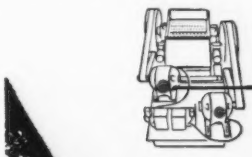

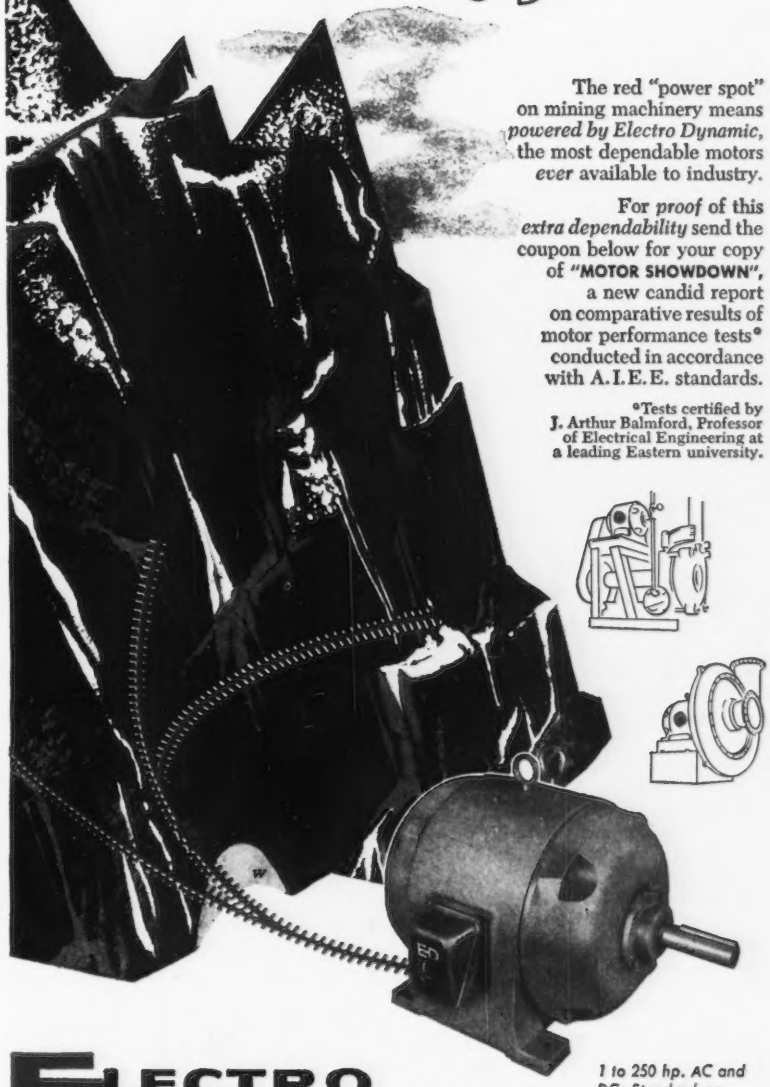

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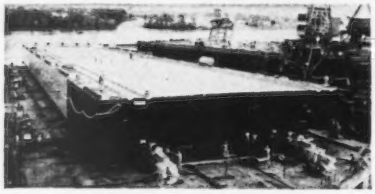

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First dock section, arriving at site on Orinoco River, after being towed across 3,000 miles of ocean.

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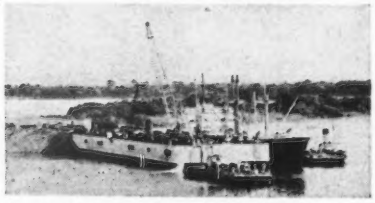

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Idaho *(Continued)*

which is to be the main shaft at the mine east of Mullan. Two crews are advancing the raise heading on a six-day-week basis.

Work was started from a point about 70 ft above the 1800-level and will be continued in full three-compartment size up to the main adit. Waste rock for the work is used for stope-filling, thus eliminating the need for hoisting it to the surface.

The new shaft, started as a winze on the 2000-level, has already been extended downward to the 2400-ft horizon and upward to above the 1800 level. Inadequacy of the present shaft has handicapped the Lucky Friday development for several years. It was driven as a prospect shaft and has proved to be too small to handle the expansion of operations which the improvement in the orebody at lower levels has justified, it was reported.

Lookout Mountain Mining & Milling Co.'s southerly exploration crosscut from the 1200-ft level of the Sunset Minerals Mine on Pine Creek has been advanced more than 2100 ft since work was started in 1952 and the face is now estimated to be within 300 to 400 ft of the downward extension of the Lookout vein which produced rich lead ore from shallow upper workings.

Down-hole diamond drilling at American Smelting & Refining Co.'s Vulcan Mine operation west of Wallace has indicated downward continuity of commercial-grade tetrahedrite (silver-copper) ore below the bottom 3000-ft level and deepening of the big four-compartment shaft to the 3400-ft level is now underway. The tetrahedrite vein, discovered in February 1953, has since been proved to contain commercial ore for a lateral distance of more than 500 ft on the 3000 level and the ore has been followed upward to well above the 2800 level.

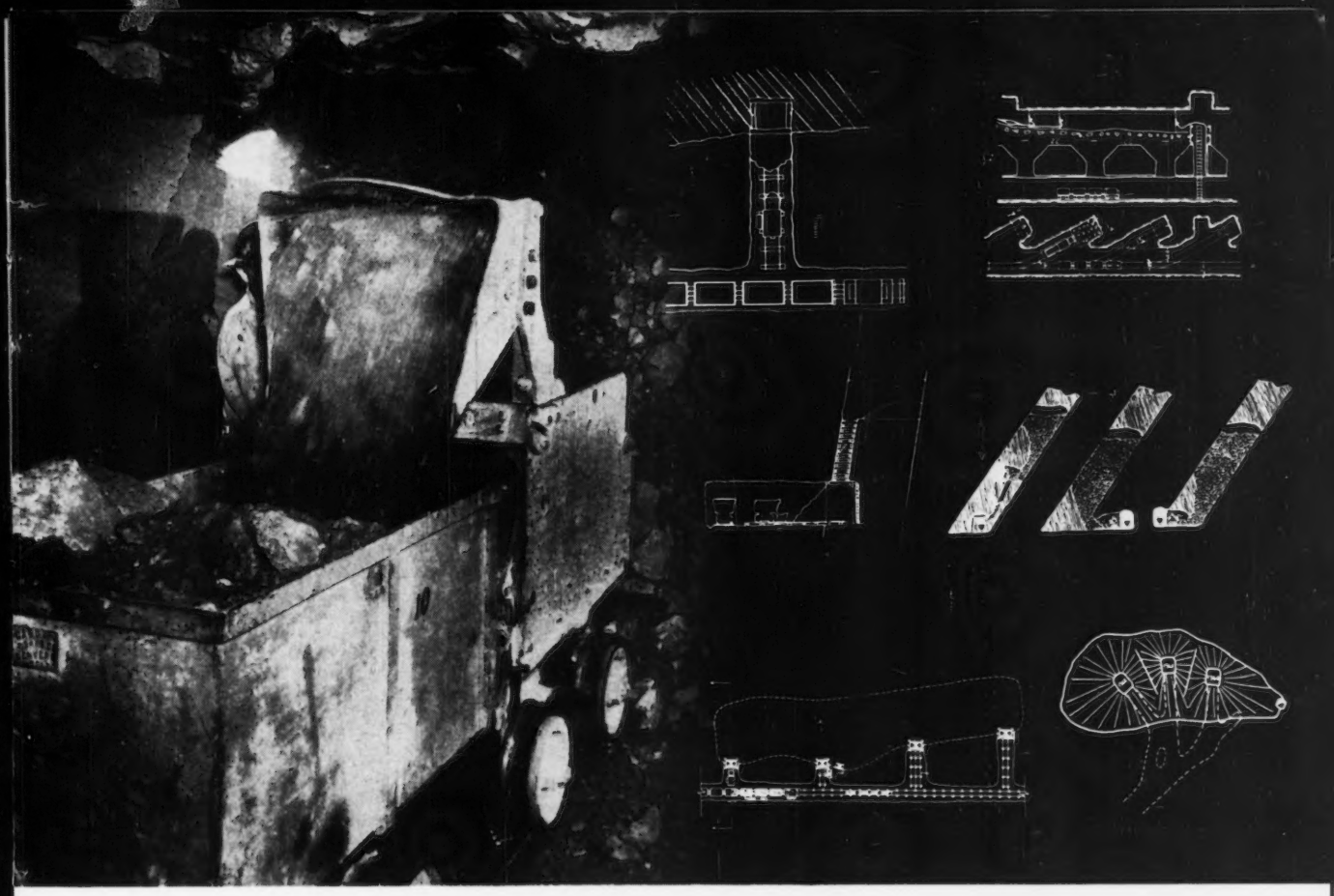
Idaho Consolidated Mines Inc. expected to have its new selective-flotation concentrator at the Twin Peaks Mine in Lemhi County ready for operating by April 1. Construction of the mill building, out of fire-resistant pumice block, has been completed, practically all necessary mill equipment has been purchased, and installation of the equipment is progressing rapidly under the direction of Mine Manager Charles Kapp.

Underground development of the mine in the rugged Salmon River Country south of Salmon is sufficiently advanced to keep the mill supplied at the rate of 125 to 150 tons per day, it is reported.

Two principal zones of lead-silver ore have been opened in the main adit level —one sufficiently high in grade to serve as "sweetening" for the wider but lower-grade ore in the other—and seven draw points for ore have been prepared.

FLORIDA

Geologists, working with the Crane Co., plumbing and heating manufacturer



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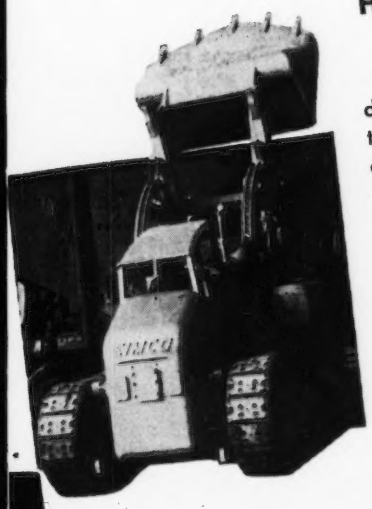

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Your mining system can, in many cases, be changed to one of the systems now in use which go by the general name of "drawpoint loading."

Hundreds of mining companies are on our mailing list to receive the latest information we can find on ideas in all parts of the world that will cut mining costs. Many of these companies have changed their systems of mining in recent years to one of the drawpoint systems or have developed a system of their own that would apply. In every case, the mines using Eimco loaders in production drawpoints, have shown savings that make for substantial cost reductions.

Write on your letterhead to be included in this mailing or for information on Eimco loaders in production loading, to The Eimco Corporation, P. O. Box 300, Salt Lake City, Utah.

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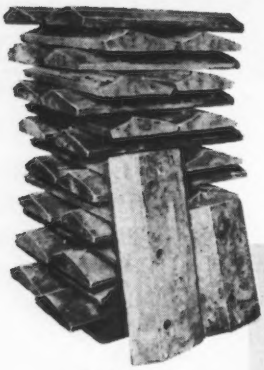
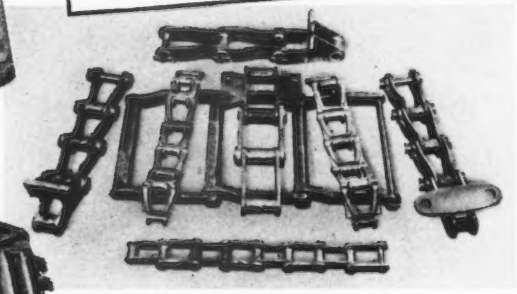


Ball Mill Liners



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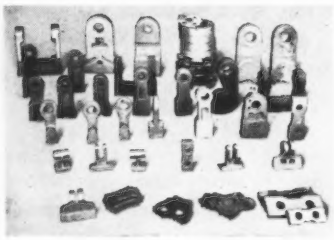

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High Bridge, N. J. — Cincinnati, O. — Birmingham, Ala. — Easton, Pa.

Florida *(Continued)*

which is to construct a titanium plant in Chattanooga, Tenn., have located concentrations of titanium dioxide, ilmenite, on the beaches in Walton County. Just what concentration and to what depths has not been determined but indications are that it may run higher than 2%, the minimum of commercial production at the present time.

The geologists, working out of headquarters at Panama City, have been prospecting under a $50,000 appropriation made by the Crane firm. Since last August they have been working west from Carrabelle with the first discovery at Phillips Inlet. So far the richest deposit discovered is in the Seagrove Beach area, on the Gulf of Mexico, about half way between Panama City and Destin.

ILLINOIS-KENTUCKY

Lack of fluorspar orders, which mining operators describe as the result of "unfair competition from foreign importations," has caused a shutdown in some plants and reduction of force in others throughout the entire Ill.-Ky. district.

All operators agree that the situation confronting the industry is serious while others freely predict that unless relief is forthcoming every plant in the district will be compelled to close.

It is presently estimated that 50% of the 2000 persons, directly and indirectly employed in the industry, have been laid off.

Effective March 1, Rosiclare Lead & Fluorspar Mining Co., Rosiclare, Ill., shut down indefinitely for lack of business. A total of 140 men have been laid off, according to A. H. Cronk, manager. Seventeen were retained to keep the grinding mill and flotation mill in operation for ceramic production.

PMT Mining Co., operating the Hicks Creek fluorspar mine in Pope County, closed down March 2, C. T. Cochran, president, announced, with 35 layoffs. Tamora Mining Co. suspended operation with 40 employees laid off.

Victory Fluorspar Mining Co., operating in the Cave-in-Rock section, shut down Feb. 1 for an indefinite period, according to A. H. Stacey, president.

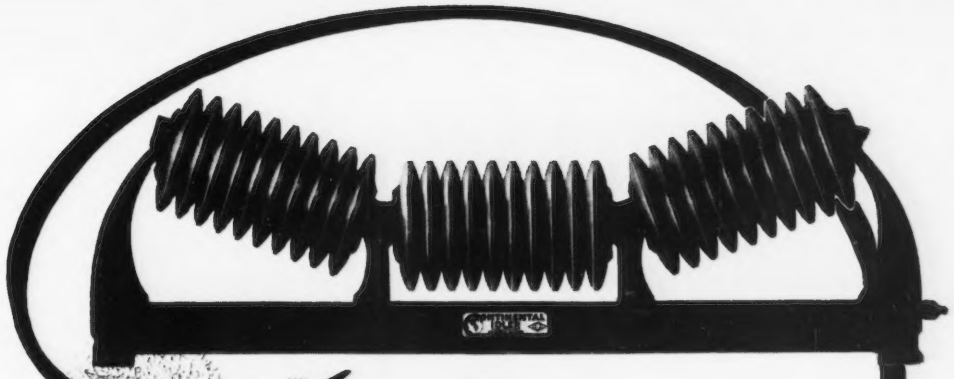
Hicks Creek Mining Co. and Goose Creek Mining Co. both have suspended operation.

Minerva Oil Co., operating the Minerva No. 1 mine and the Crystal mine, in the Cave-in-Rock region, announced reduction to a 3-day work week, effective March 1, at both plants.

Ozark-Mahoning Co. stopped work at two of its shafts, the W. L. Davis No. 3 and the S. E. Oxford No. 11. Twenty men were affected by the order.

Aluminum Co. of America, fluorspar division, of Rosiclare, recently laid off 20 employees.

In the Kentucky district, where 25 or more fluorspar properties were operating a few years ago, today there are only four in operation. All of the independent operations are shut down. Among the mines that have closed are Delhi, Davenport,



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Illinois *(Continued)*

Eagle, Guill, and Inland Steel Co.'s Keystone. Continuing operation up to the present are U. S. Steel, fluorspar division, at Mexico; Carr mine, of the Kentucky Fluorspar Co., the Nancy Hanks, operated by Loyd and Tinsley; and the Crider mine, in Caldwell County.

A survey report which cites present ills of the industry and recommends a tariff increase or a restrictive import quota, has been prepared by Clyde L. Flynn, Jr., secretary of the Independent Fluorspar Producers' Association. The report will be submitted to President Eisenhower and Illinois' representatives in Senate and House.

Illinois Representative C. W. Bishop, appearing recently before a Senate Subcommittee, urged committee support of action to check imports of Mexican fluorspar by higher tariff rate or establishment of a quota system.

LOUISIANA

Freeport Sulphur Co.'s $14-million Garden Island Bay Mine (see *E&MJ*, December 1953, p. 168) already has reached its production goal. It is producing sulphur at an annual rate of 500,000 long tons.

MICHIGAN

Cleveland Cliffs Iron Co. is sinking a new production shaft at its Cliffs Mine in Ishpeming. The new shaft will handle the ore now hoisted through the "A" and "B" shafts and is scheduled for operation in 1954.

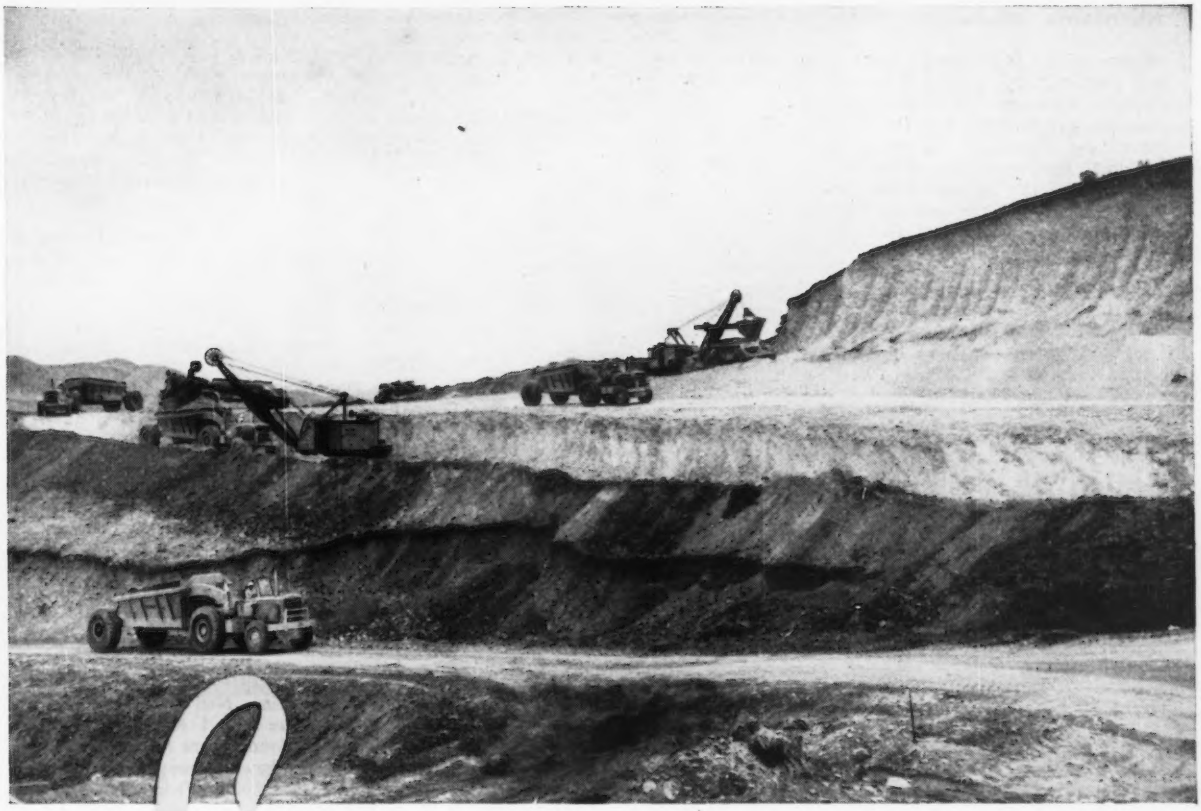
Republic Steel Corp.'s Tobin Mine at Crystal Falls, which made its first shipment in 1901, is stock-piling ore for the 1954 season. In 1947 the Tobin installed an underground conveyor system which was among the first to be employed in a Lake Superior underground mine.

About 37 men were affected by the curtailment of one shift at the Sunday Lake mine of Pickands, Mather & Co. at Wakefield. The property will work five days per week, two shifts a day instead of three. Superintendent Rodney Hodge states that the reduction is due to a development program which is to begin at once.

MINNESOTA

For the first time in years mine operations in the Lake Superior area are being conducted on a practically universal basis of five days per week. Some mines are working three shifts a day. The M. A. Hanna Co. was the last of the large companies to make the change from a six to five day week.

The fourth symposium on mining geology of the Lake Superior district was held in Hibbing April 9th. It dealt with the



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Minnesota *(Continued)*

relation of the Michigan-Wisconsin iron and copper districts to the Minnesota districts. Program was arranged by a joint committee of the Arrowhead Chapter of the Minnesota Society of Professional Engineers; representatives of industry, and the faculty of the School of Mines & Metallurgy and the Department of Geology of the University of Minnesota.

Winter stripping is being carried on at most of the M. A. Hanna Co. mines on the Mesabi range, in most cases on a fifteen shift week basis. Concrete work and steel erection for the Morton mine screening and washing plant is being continued.

M. A. Hanna Co.'s Iron Mountain mine in southeast Missouri, about 90 mi from St. Louis and one of the oldest active iron mines in the U. S., completed its open pit operations in 1953 when the "Blue John" cut was exhausted. Future work at the mine will be entirely underground. With development drifts 15 ft high and 20 ft wide and stopes 24 ft high and 35 ft wide, small electrically driven shovels are used and the mine is almost completely mechanized.

Caland Ore Co. Ltd. (Inland Steel Co.) has announced plans for the construction of three dams and other water works in connection with the development of their Steep Rock lease near Atikokan, Ontario. Caland's dredging plans are expected to require about 1½ years for completion.

Because of several factors a later than usual opening of the 1954 shipping season is anticipated. The Korean truce, the reduced current steel output, the record tonnage of ore moved last year and the prospect that more large, fast carriers will be in operation in 1954 are the main reasons for the prediction.

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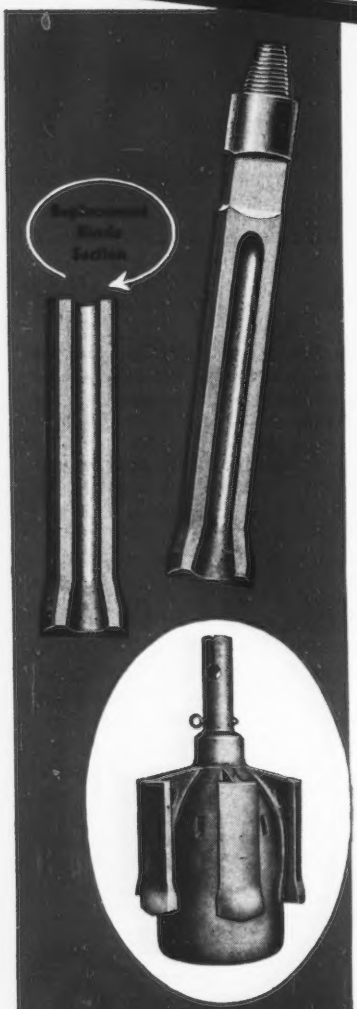

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MISSOURI

St. Joseph Lead Co. boasted nine mining crews and one surface area with safety records of no-lost-time accidents in 1953, according to *The Lead Belt News.*

These 10 groups represent 315 employees and vary from 15 men at the Doe Run Mine to 53 men at the Leadwood North Mine. Employee units were listed as:

Baker Mine, Neil Cooper, foreman; Bonne Terre No. 1 Mine, Bill Meyer, foreman; Bonne Terre Mine Shop Crew, Roscoe Fowler, foreman; Doe Run Mine, Jack Weber, captain; Federal No. 5 Mine, Everett Gross, foreman; Federal No. 6 Mine, Fred Fisher, foreman; Leadwood North Mine, Bill Byington, foreman; Mine La Motte Mine, Homer Cooper, foreman; Mine La Motte Mine, Alfred S. Thomure, foreman; Leadwood Surface area, including: machine shop, Arthur Freeman, foreman; yard crew, Charles Thornton, foreman, and electric shop, Glen Maurer, foreman.

MONTANA

Ambassador Mines Corp. has relinquished the lease which it held from Sunny Peak Mining Co. on a 21-claim property in Sanders County and has merged with the Sunny Peak firm.

In addition to giving up the lease, Ambassador conveyed to Sunny Peak the Black Bear and Brown Bear claims, adjoining the leased ground, and all its mining machinery and equipment, receiving in return shares of Sunny Peak stock for distribution to its stockholders.

American Chrome Co. operations in the Beartooth Mountains, Stillwater County, near Nye, have reached the present capacity objective, producing about 1000 tons of chromite crude ore daily.

It is turning out an estimated 380 tons of chromite concentrates per day of approximately 38% grade. The company is employing more than 300 men and depending almost entirely upon concentrating tables to make its finished product which is being stockpiled for the present.

American Chrome Company is a subsidiary of Goldfield Consolidated Mines

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Strip Mining

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Hazacord Type SH-D Portable Cable

Ability to withstand extreme mechanical abuse and electrical stress is vital for long operational life in portable cables for shovels and drag lines. Hazacord Type SH-D Portable Cable combines the greatest electrical safety with maximum mechanical strength for long life and minimum outage in installations up to 15,000 volts.

Hazacord SH-D cables are protected by the mold-cured Hazaprene ZBF sheath with tire-tread toughness for extra mechanical strength. The copper shielding braid over each conductor, when properly grounded, equalizes electrical stresses and drains off all capacity-charging currents, insuring safety in handling. Grounding conductors in the interstices contact the copper shielding braid, providing an adequate low resistance ground for the equipment.

For information on this widely used design or on other portable cables, consult your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

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Montana *(Continued)*

Co. of San Francisco. Estey A. Julian is president of both companies.

At the Nye operations John Bley is plant manager, William Hisle is mill superintendent and William Foster, formerly of Kellogg, Idaho, is mine superintendent.

NEVADA

Two carloads of uranium ore have been shipped from the Moonlight Mine in Humboldt County to Uranium Metals Corp. in Denver, and have assayed at .20%, according to the purchasers. The mine is situated 80 mi northwest of Winnemucca, and was recently surveyed by five geologists sent out from Denver by Uranium Metals Corp.

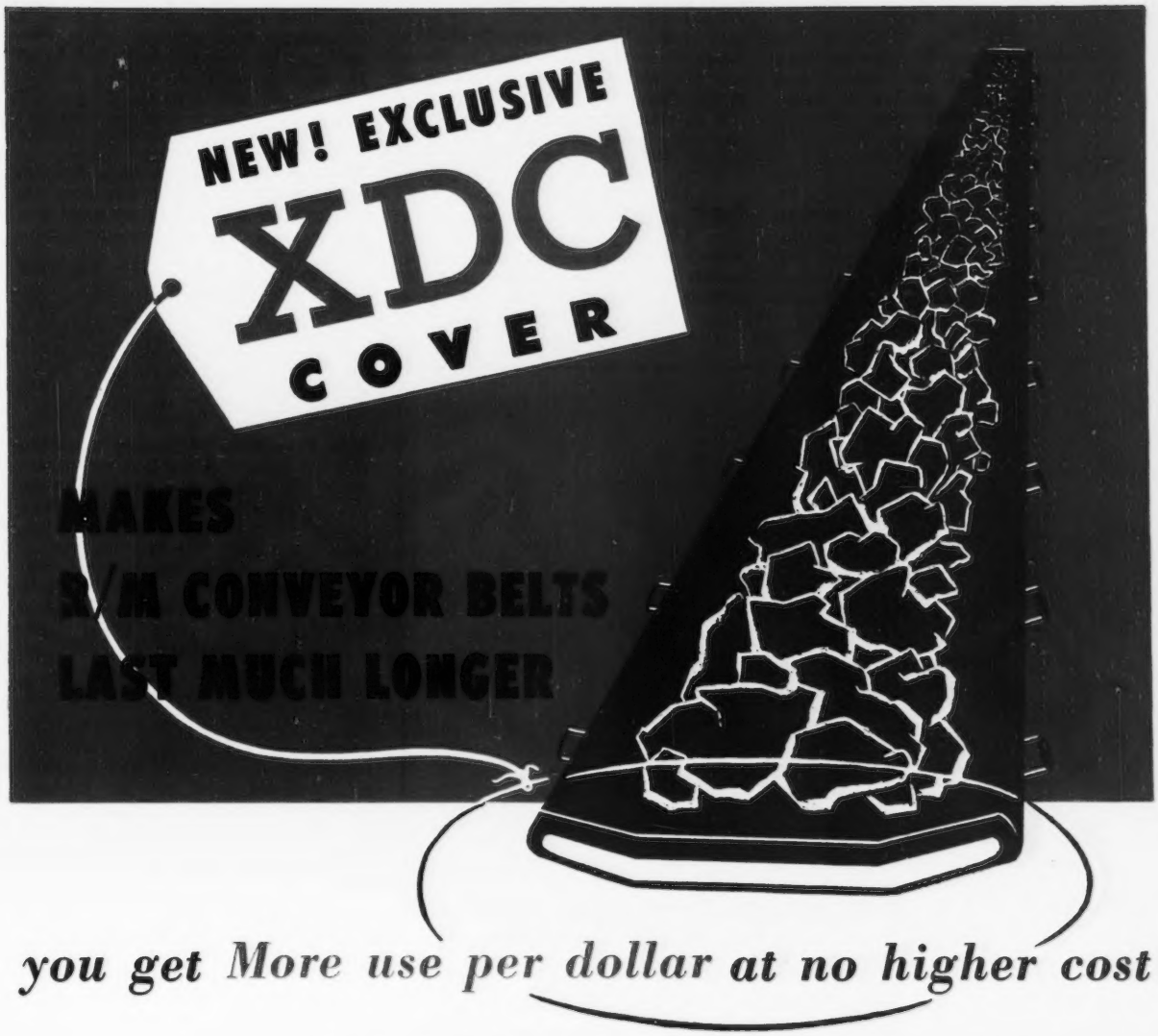
Bureau of Mines has announced plans to spend $789,000 of Federal funds in Nevada during fiscal 1955. Of this amount $380,000 is earmarked for research aimed at alleviating deficiencies in high-grade iron, manganese, chrome, cobalt, nickel and tungsten ores; $299,000 for research on production and uses of titanium, and field investigations of nonferrous metals that are in short supply; $15,000 for investigation of accidents and rescue work; and $34,000 for the expenses of the Bureau of Mines in Nevada.

Fifty tons of raw ore are being turned into tungsten concentrates daily at the recently completed Toiyabe Mining & Milling Co. mill near Gabbs. The mill is operated by Henry Baxter and employs nine persons. R. R. Reed is superintendent, Baxter is president, and Mrs. Baxter is secretary-treasurer. The firm is buying raw ores from small producers and has commitments well in advance. The mill is the third of its kind to be erected in the Gabbs area to take care of the ore being produced from six deposits in that vicinity.

Open pit mining operations have been resumed in the old Atlanta Camp of Lincoln county, and two 25-ton trucks are hauling ore to the McGill smelter. Ore shipped to date has averaged more than $8 per ton in value. It contains low gold content ore and an appreciable amount of uranium. Approximately 1,400,000 tons of ore have been blocked out, and it is estimated that there are 5-million more tons available at the site. Tentative plans are being made to construct a mill near the mine.

Nevada Perlite Co. of Churchill County has purchased ten acres of the east part of the Mills ranch near Fallon to use as the site of their new mill. Construction is expected to begin in the near future.

In the Signal Peak mine in Pershing County a crew is sinking a winze on a low grade gold bearing vein at the end of a 200-ft tunnel. The winze is expected to drop 100 ft or more. The men are employed by the Cal Alta Oil and Mining Co. in the Seven Troughs district Earl Tucker is overseeing the work. Cal Alta, which is the successor of the Gold-



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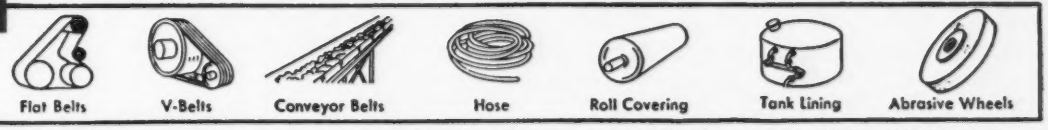

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
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Nevada *(Continued)*

en Horseshoe Mining Co., also has taken over a tungsten property near Nixon which is owned by Sanford A. Bunce and Associates, of Lovelock.

NEW JERSEY

New Jersey Zinc Co. and American Cyanamid Co. have announced a contract under which the zinc company will purchase the Cyanamid company's Gloucester City, N. J., titanium dioxide plant. The plant will be turned over to the zinc company after Cyanamid's new and larger titanium dioxide plant at Savannah, Ga., has been completed and placed in operation.

It is expected that this turnover will take place in the latter part of 1955.

OREGON

A modernization program costing approximately $100,000 is underway at Pacific Carbide & Alloys Co.'s plant in Portland. Pre-baked electrodes were replaced by Söderberg type continuous carbon electrodes and as a result there will be increased production of calcium carbide. The high-calcium limestone, about 35,000 tons annually, comes from the company's quarry near Enterprise.

Bonanza Oil & Mine Corp.'s Bonanza quicksilver mine has been shut down due to high costs and present operating conditions.

Placers, Inc., a new company, has taken over and plans to work the Pedro Brothers' claims on Connor Creek in Baker County with a power shovel. The gravel will be taken to a washing plant down stream. Officers of the company are all Oregon men except the president, Vernon McClure, who is from Midvale, Idaho.

State Department of Geology And Mineral Industries reported that the highest grade chromite sample received in the past 5 years came from the Chrome Dome No. 1 claim on Whiskey Creek, Josephine County. Owners are George W. Bauguess and Grover C. Royer. Analysis showed 58.71% Cr_2O_3 and 12.78% Fe. Chrome-iron ratio is 3.13:1. A shipment of similar grade would bring $163.04 per ton at Grants Pass stockpile.

Harvey Machine Co. of Los Angeles is experimenting at its alumina-from-clay plant at Salem to show practical ways of treating other than high-aluminous clay for recovering alumina. The company purchased the plant from the Government which had built it during World War II.

Malheur Wunder Earth Inc., has approximately 3400 acres in northern Malheur County either located or leased containing diatomaceous earth deposits. A Raymond mill with cyclones is to be installed this spring. Don Galbreath of Vale is president.

NEW MEXICO

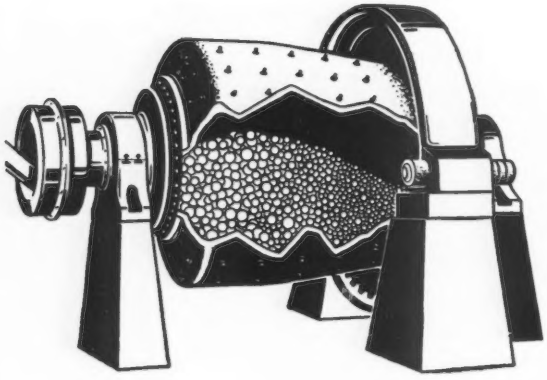
Chino Mines Division of Kennecott Copper Corp. went on a five-day weekly operating schedule resulting in the lay-off of some 300 men. This was announced by W. H. Goodrich, Chino Mines, general manager.

NORTH CAROLINA

General Services Administration, which had suspended Government stockpile purchases of mica at the Spruce Pine Depot, resumed full scale buying March 15.

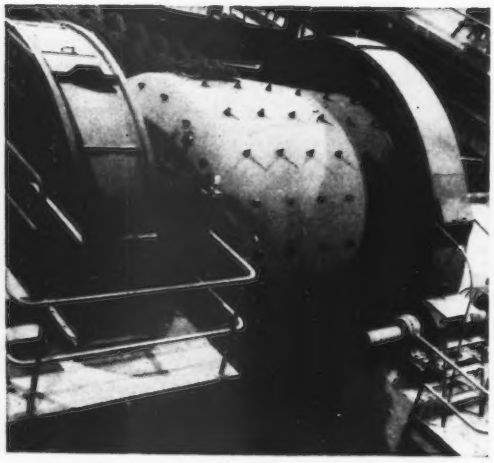
Suspension of sales followed resignations of the depot superintendent and of three buyers and suspension of a fourth buyer. The resignations followed a Federal Bureau of Investigation inquiry after miners had complained of unwarranted down-grading.

New superintendent is Alvin Overby who was sent to Spruce Pine from the GSA Atlanta office. New buyers are Edward Burleson and Wayne Buchanan, who were recruited from the Spruce Pine



TRICONE MILLS

The Hardinge Tricone Mill is ideal for large tonnages because of its design. The tapered barrel causes correct ball alignment, conserving grinding energy. The Tricone Mill occupies less floor space for a given grinding volume than any other mill ever built and overall power consumption is reduced 5% by new design bearings. A grate may be added when more capacity is required but the wear of balls is minimized because only small balls come in contact with the grate. Bulletin AH-414-1.



One of four 11' diameter Hardinge Tricone Mills at Barvue Mines, Ltd., Barraute, Quebec, grinding more than 5000 tons of zinc ore daily

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mica district of the Tarheel State.

The Depot has been authorized to continue until 1957 with a total outlay of some $25-million for 25,000 tons of mica for stockpiling.

Lithium Corporation of America, Inc., on March 8 announced plans for a lithium mining project in Lincoln, Gaston and Cleveland Counties. The project will cost $7-million and will involve five mining operations on 2000 acres of land which has been purchased in the area.

K. M. Leute, president of the Minneapolis corporation, said that a 340-acre tract also has been purchased near Bessemer City for the construction of a plant where the ore will be refined. He said the plant will operate continuously and will have an initial employment of around 350 persons.

"Under our present setup," he said, "we have mineral holdings in South Dakota while our plant is in Minneapolis. This makes it necessary to haul the ore a considerable distance. In North Carolina we will have the plant adjacent to the mines, making for efficient operation."

Leute said the tract which has been acquired is believed to be one of the largest reserves of lithium ore in the world.

Foote Mineral Co. of Philadelphia, which began operations at Bessemer City three years ago and has large reserves of lithium bearing ore in that area, meanwhile, has announced that a large part of its authorized several million dollars for plant expansion will be invested in its plant at Kings Mountain, where the number of employees will be increased from 60 to 200.

TENNESSEE

Manganese mining on a large scale is being undertaken by Colitz Mining Co. in Johnson County. The company is opening up a new area in Upper East Tennessee which is likely to spill over into nearby Virginia and North Carolina. The area is rich in mineral deposits but has never been extensively mined.

Colitz Mining Co. is composed of five brothers and three sisters, originally from Pottsville, Pa., where the company has participated in anthracite coal mining for the past 22 years. The company is well known in the mining industry.

John Colitz, engineer, and Michael Colitz, geologist and metallurgist, are in charge of the preliminary work in Johnson County where development work is now in progress. The company is clearing a 50-acre site at Sutherland for the construction of a large ore processing plant. The company will construct a 5-million gal artificial lake for ore processing water and a 40-acre settling basin which will empty into Beaver Dam Creek.

Heavy modern equipment has been moved into the area to construct roads and the lakes and processing plant equipment has been ordered. The company has leased some 60,000 acres and plans to process other minerals if found in sufficient quantities. Damascus, Va., will be the railhead for operations.

UTAH

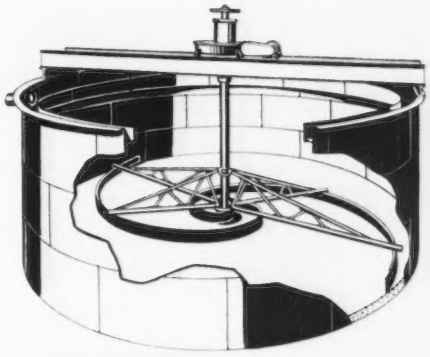
Kennecott Copper Corp. announced Feb. 27 that its Utah and Nevada properties will go on a five day week March 15, with a layoff of some 800 men resulting.

L. F. Pett, general manager of the Utah Copper Division, said 650 men will be laid off, and J. C. Kinnear Jr., general manager of the Nevada Mines Division, McGill, Nev., reported 170 men would be cut from the operating staff. Reductions at Ray, Ariz., and Chino, N. M., had been announced earlier. The layoff announcement came one week after a cutback to a six-day work week had begun in Utah and Nevada operations, first such slash in the work week at Kennecott since World War II.

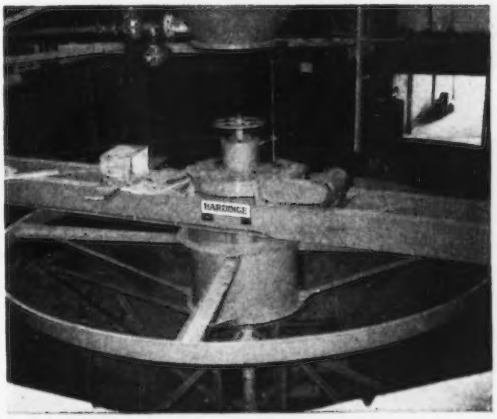
The boom in the Colorado Plateau uranium region has spawned a boom in formation of new mining companies. Among them:

Texas Uranium Co., president, Kyle Bretz, Beason Bldg., Salt Lake City; James E. Ellison of Layton Sugar Co., vice president; Tom Metos, secretary. Capitalization $250,000, subscribed $25,000.

Temple Mountain Uranium Co., pres-



"AUTO-RAISE"
THICKENERS



Lower unit of a 35′ Hardinge superposed two-compartment Thickener at Barvue Mines, Ltd., Barraute, Quebec handling zinc concentrate.

One of the distinctive features of Hardinge Thickeners is the "Auto-Raise" driving mechanism, which automatically lifts the scraper away from an overload or obstruction in the tank bottom—eliminating costly breakdowns and delays. Another optional feature is the double-spiral scraper which removes settled solids from the tank bottom in one revolution. Bulletin 31-D-1.

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Utah *(Continued)*

ident Herman Heinecke, Midvale, Utah; George Heinecke, Midvale, vice president; Robert L. McGee, secretary. Capitalization $1-million, $21,000 subscribed.

Slick Rock Uranium Development Co., president Grant W. Wrick, Moab, Utah; Walter H. Gramlich, Moab, vice president; B. A. Hartman, Salt Lake City, secretary-treasurer. Capitalization $200,000, $20,003 subscribed.

Utex Exploration Co. has completed shipment of 1000 tons of uranium ore to the Salt Lake mills of the Vitro Uranium Co., according to Charles Steen, Utex president.

Steen termed the shipment an experiment to see whether the Vitro mill could handle reduction of the Utex ore. He expressed confidence it could be efficiently milled, since Vitro has reduced similar ores from adjoining properties in the Big Indian district of San Juan County.

Increasing shipments to the Salt Lake Tungsten Co. refinery from points in Utah, Nevada and Montana are reported by Blair Burwell Jr., superintendent of the new facility. The refinery at Salt Lake reduces concentrates carrying as low as 5% tungsten oxide.

Concentrates are now being received from the Baltimore-Camas mill at Ely, Nev.; the Glen, Mont., mill operated by Minerals Engineering Co. and the H. M. & S. Milling Co. of Salt Lake. Concentrates are expected shortly from a mill being completed by Art Williams in the House Mountain area of Millard County, Utah, and from Combined Metals Reduction Co. mills.

The Glen, Mont., shipments have averaged some 10 tons daily. Shipments of crude ore are being received from Gold Hill and Delta, Utah, and the Salt Lake Tungsten Co. is likewise reworking tailings from a World War II tungsten stockpile in Salt Lake.

The Salt Lake firm is maintaining a 66⅔% of capacity rate, Burwell reported. It is a jointly owned operation of Minerals Engineering Co. of Grand Junction, Colo., and Sylvania Electric Products Co.

Shipments from properties of the Midland Uranium Co. at Dewey Rim in the Yellow Cat District of Grand County, Utah, are averaging 80 tons monthly. Shipments of carnotite ores are going to the Climax Uranium Co. mill at Grand Junction, Colo., according to Midland's president, Thomas Short.

He said a 6x150-ft lenticular body of ore has been uncovered, with the firm seeking additional leasers to work its properties.

Homestake Mining Co., San Francisco, has obtained an 18-month option on two uranium properties near Moab, Utah. The agreement covers claims owned by La Sal Mining Co. and Alice Mining Co., both of which are operated by Tom Hudson and associates.

Kennecott Copper Corp. and its subsidiary, Bingham & Garfield Railway Co., charge in briefs filed in the Utah State

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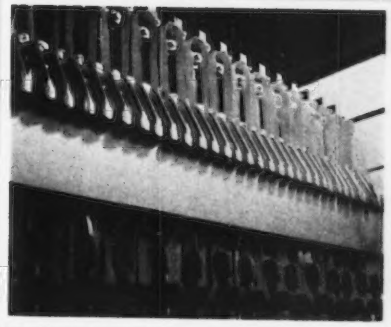

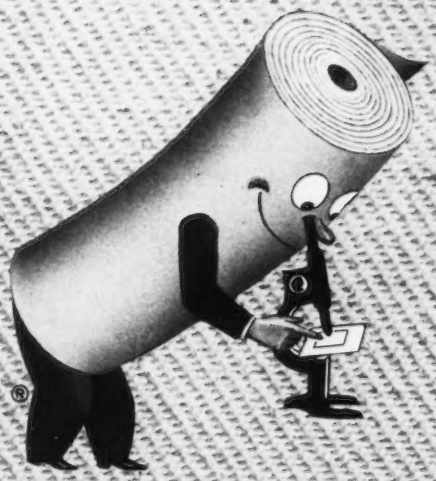

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One of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products. Here fabric thickness after weaving is being gauged.

Utah *(Continued)*

Supreme Court that the Utah State Tax Commission has misinterpreted federal and state laws in its demand for $5-million in alleged delinquent franchise taxes from the two companies.

The briefs were in support of a writ, sought by the firms, to review and annul a Tax Commission order of July 23, 1953. The order, climaxing an eight year study of the case, sought the $5-million payment from Kennecott and the railroad.

Coke of a quality possibly usable by the aluminum industry in electrodes has been produced from gilsonite at the Bonanza, Utah, pilot plant of the American Gilsonite Co. It was made clear, however, that the pilot plant runs have been experimental.

Observers pointed out that success of the operation could lead to a Pacific Northwest aluminum industry outlet for the unique Utah hydro-carbon.

Present plans call for stockpiling of the coke produced from forthcoming runs. Stockpiled coke will be calcined and sent to the Pacific Northwest for experimental use as aluminum industry electrodes.

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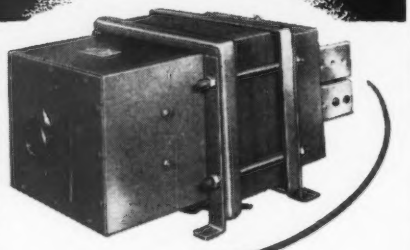

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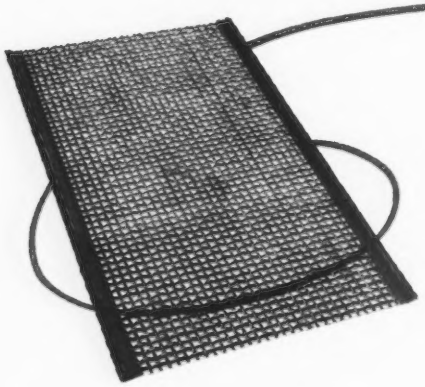

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PIONEERS IN ELECTRIC SCREEN HEATING — FIRST IN THE FIELD OF LOW VOLTAGE AND HIGH AMPERAGE SCREEN HEATING

WASHINGTON

A Spokane firm has been organized to provide ore milling service at mining properties on a contract basis—believed to be a new wrinkle in the industry.

The firm, Contract Milling Co., is headed by a Spokane metallurgical engineer, J. Stanley Huckaba. He said the new firm's service "is intended primarily for a mine's development period when the operator may not know what size mill or type of flowsheet he will need."

The contract milling operation will provide the mine operator with income while he decides whether he can afford a permanent mill and learns what kind of installation it should be.

Huckaba estimated that a semifabricated plant with ball mill capacity up to 125 tons daily could be erected on a mining property in about 30 days. The only cost to the mine operator would be, said Huckaba, a cash advance covering freight and mill foundations.

Contract Milling Co. has signed a two-year contract with Mitchell Mining Co., Mount Vernon, Wash., to mill production from its Marget Ann mine, a gold-silver-manganese development north of Walkerville, Mont., a suburb of Butte. Huckaba said this first plant should be in operation by June 15.

Grandview Mines, Inc. spent $29,736 last year on exploration of the Hartbauer and Dosser-Maki-Lotze properties in northern Stevens County. A contract with DMEA reimbursed the company in the amount of $10,766.

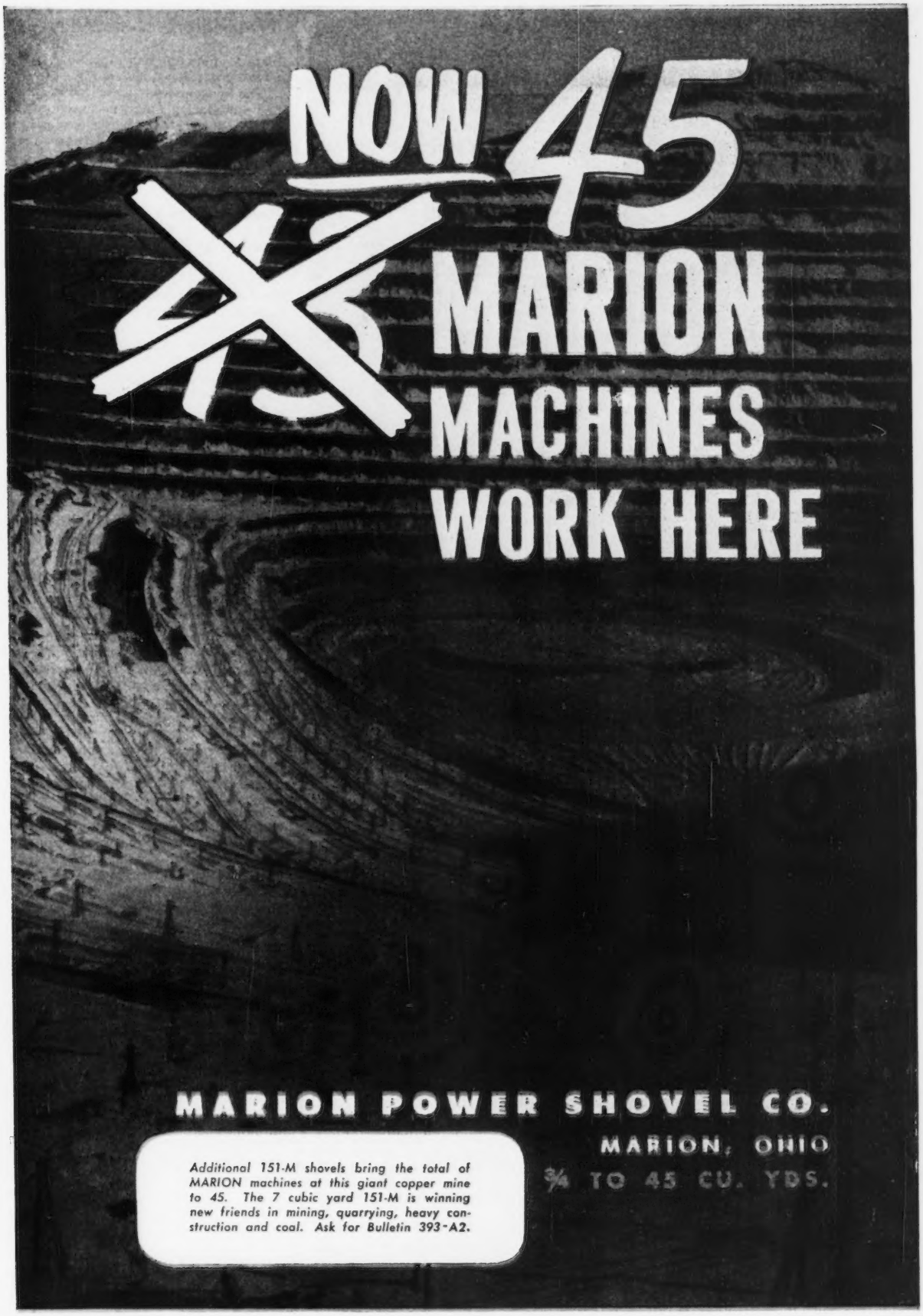
More than 3000 ft of diamond drilling was done in 1953 and about the same amount is planned for this year to complete the projects. Some prospecting and exploring also is planned this season.

Hartbauer results "indicate the possibility of a small open pit zinc operation which under decent metal prices would prove quite profitable for Grandview", according to the company's annual report.

Pacific Northwest Alloys Inc., which leases the Mead plant from the Federal Government, has recently added 70 men to its payroll and expected to hire more according to H. B. Megill, executive vice-president and general manager. He reported the payroll would soon be back to where it was in October. Suspension of production of ferrochrome for about 6 weeks was caused by the drop in demand of the steel manufacturers for the plant's ferrochrome. If steel business improves employment at the plant may reach 350 by late May or June, according to Mr. Megill.

Kaiser's Trentwood aluminum rolling mill recently recalled 50 men, part of the group laid off Jan. 7, when a 15% reduction in production department personnel went into effect. The total force was already up to 2250, a little above the plant's 7-yr average. Improved business conditions and increased orders prompted the addition of workers.

Alpine Mining Co. has abandoned lead-zinc mining at its Elko County, Nev., property due to low lead-zinc prices and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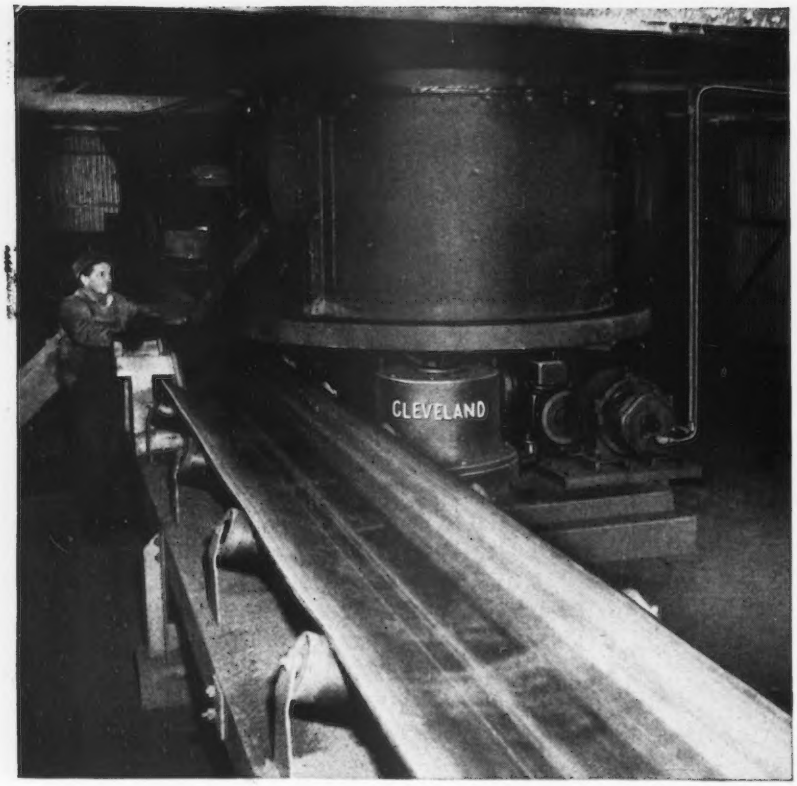

Cleveland feeder table drives at work at an iron ore sintering plant.

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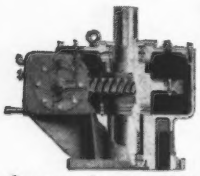

Cutaway of an 800 VT worm gear feeder table drive shows Cleveland's one-piece gear shaft construction.

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CLEVELAND Worm Gear Speed Reducers

Washington *(Continued)*

plans to mine tungsten in another section of the property.

The Spokane firm announced it expects to be producing tungsten concentrate by July 1. Surface exploration disclosed an average of 1.25% tungsten trioxide over a distance of 1500 ft and 2.31% over a distance of 300 ft, the company announced.

Work has begun on a $219,410 exploration project at the Holden, Wash., mine of the Howe Sound Co. John J. Curzon, manager, said the present Holden mine workings will be extended to prospect the downward projection of a mineralized zone outcropping on Buckskin Mountain.

He estimated that drifting would run 4000 ft and diamond drilling 7000 ft.

DMEA is providing half of the money for the exploration. Curzon said work on the main haulage level, at 1500 ft, is on a one-shift basis and a second shift will be added later.

Howe Sound Co. announced also expanded production at its Calera Mining Co., Cobalt, Idaho, after a year of curtailed operation. E. B. Douglas, manager of the Blackbird Mine at Cobalt, said the crew will be expanded from 130 to 270 men and production increased from 200 tons to 600 daily.

The mine and 600-ton mill produce a cobalt concentrate and copper concentrate which are shipped to Salt Lake, Utah, for refining and smelting. Operating difficulties at the Salt Lake plant forced a slowdown in mine output. But the refinery now is being operated by Chemical Construction Co., a subsidiary of American Cyanamid Co., which developed the refining process and erected the plant.

The chemical construction firm will operate the plant for two years or until it becomes a successful commercial operation.

Northwest Magnesite Co. near Chewelah has suspended operations temporarily because of a low demand for magnesite from the steel industry. General Manager Howard R. Ziebell said 350 men were employed on a three-shift basis.

Ziebell said the shutdown, which began March 1, may not exceed six weeks. He believes customers' inventories will be adjusted by mid-April so the company can resume production.

The Northwest Magnesite firm has operated since 1916 as a producer of magnesite in northeastern Washington state.

Knob Hill Mines Inc., will mine and mill silver-gold ore in the Republic District of northeastern Washington under an agreement with Day Mines, Inc., of Wallace, Idaho. The Aurum holdings of Day Mines adjoin Knob Hill to the south and west.

Columbia Gypsum Products Inc., Spokane, doubled its output of gypsum rock last year, and intends to further increase its production in 1954, according to Morris Martin, general manager. Some 60,000 tons of gypsum rock were shipped from the quarry near Windermere, B. C.

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LA-8

IN CANADA

QUEBEC

Possibility that a new uranium field may be developed just 40 mi west of Montreal is seen in the exploratory work being done near the village of Oka, not far from the Ottawa River.

Chief participant is Molybdenum Corporation of America, which has optioned a lease on 8000 acres and has been working for some months without handicap of headlines. Two drills have been at work and the management admits to being "hopeful." Unofficial reports suggest indications of a substantial tonnage of good grade. In addition to uranium the work has disclosed indications of tantalum-columbium which might also prove worth while.

A staking and leasing rush of good proportions has developed, other companies now in the area including Beattie-Duquesne Mines, Headway Red Lake Mines, Coulee Lead & Zinc Mines, Nipiron Mines, and Steeloy Mining Corp., as well as numerous syndicates and individuals. The district is old and long settled farming country in which many landowners hold only surface rights.

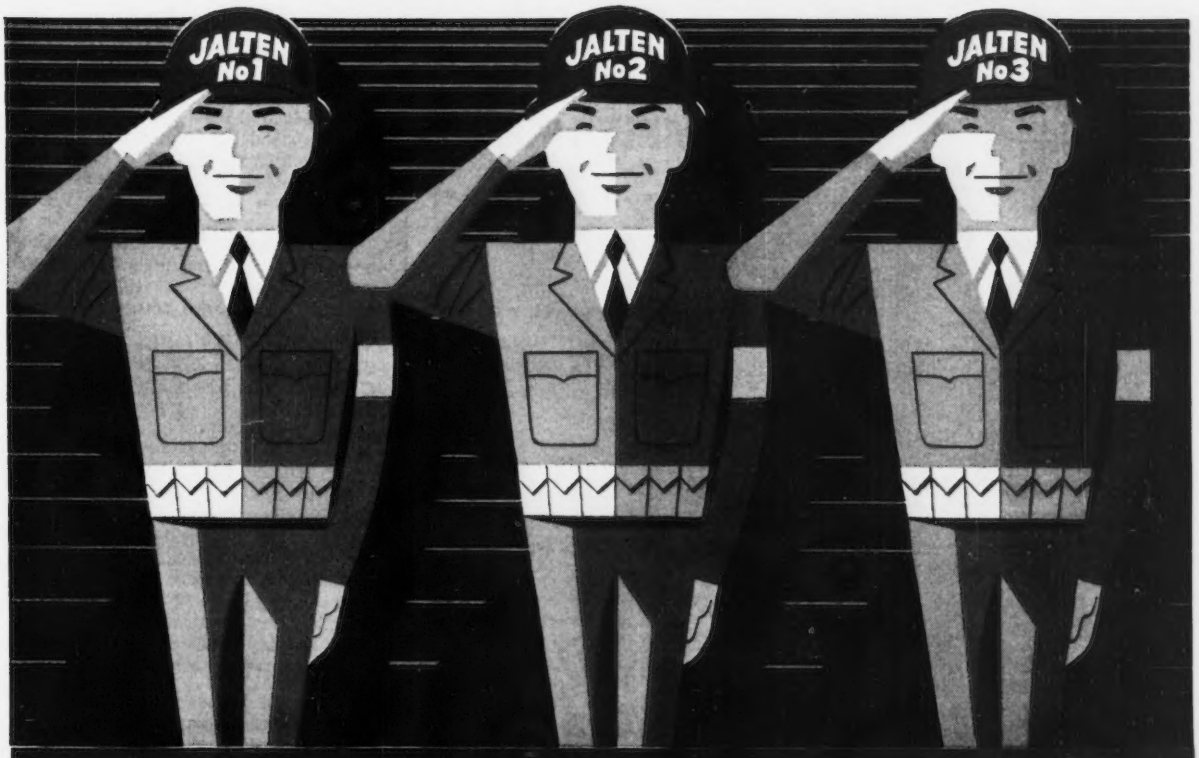
Quebec's newest base metal producer has started operations, Quebec Copper Corp. having placed its mill in operation. With rated capacity of 800 tons per day, the plant is currently treating 400-500 tons; all results are reported quite up to **expec**tations.

The mine has been developed well ahead of production needs, and the workings are ready for mining down to the bottom level at 1160 ft. Ore reserves are believed adequate to support the mill at rated capacity for four or five years; grade is estimated at somewhat better than 2% copper. The property is near the town of Eastman in the Eastern Townships region.

Establishment of a copper-nickel smelter and refinery is planned by Eastern Smelting & Refining Co., newly-formed to construct a plant at Chicoutimi, not far from Arvida. Planned daily capacity is 200 tons each of copper and copper-nickel concentrates for output of 27-million lb of refined copper and 7-million lb of refined nickel annually.

It is expected that the plant will be in operation within two years, chief customer to be Eastern Metals Corp., now considering production plans on its property in Montmagny Co., southeastern Quebec.

Asbestos Corp., big independent producer of the Thetford area, hopes to have its new Normandie mine in production this year. Construction of the $6-million 5000-ton project is well on schedule and the mill is expected to be in full operation before 1955. In the meantime Normandie ore reserves have been enlarged and stand at 35-million tons compared with 19-million tons a year ago. The company's total reserves are now estimated at 104.6-million tons.



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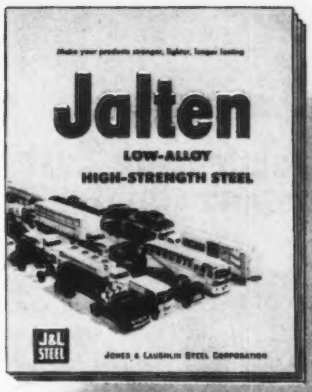

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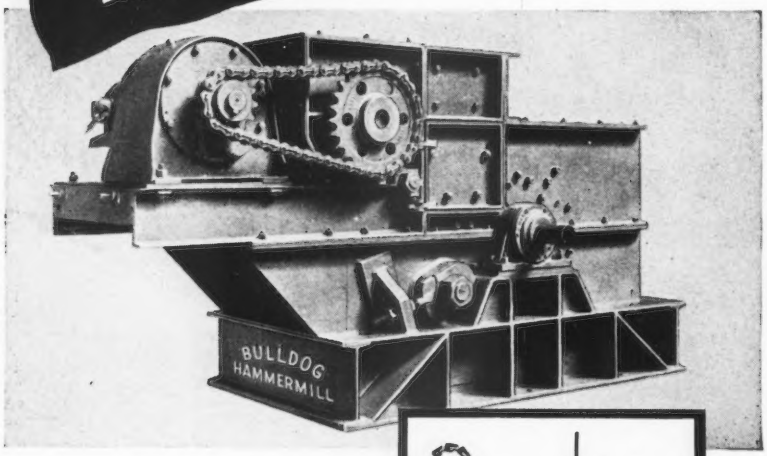

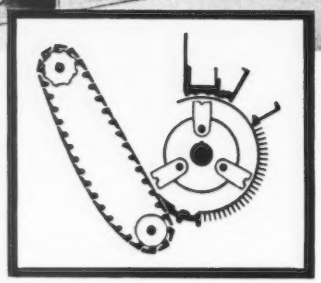

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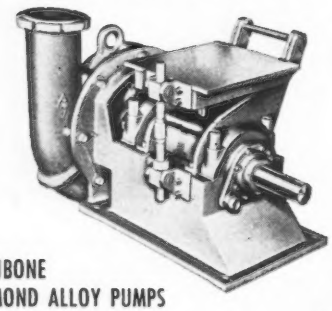

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HYDRAULIC DIVISION
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PETTIBONE MULLIKEN CORP.

Quebec *(Continued)*

Shaft deepening is just about completed at the property of New Calumet Mines, Ottawa Valley lead-zinc producer. Its big new production shaft was started several years ago and has been taken down by stages to a depth of 2058 ft. The levels to be established from the latest stage will be at the 1800-, 1925-, and 2050-ft horizons.

Production operations are proceeding normally, the mill treating around 30,000 tons per quarter. Profits have been deeply pared by metal price cuts, but are still being maintained.

First production results from Opemiska Copper Mines, first Chibougamau producer, are decidedly encouraging. In January, first full month of operations, the mill treated 9560 tons with grade of 5.99% copper. Resulting production was 2048 tons of concentrates averaging 26.48% copper, with gold values in addition; recovery averaged 93.6% for copper and 78.8% for gold.

While it is too early to report profits, since both grade and costs are above normal, operations for the month are estimated to show an operating profit of $40 per ton of concentrates.

Chibougamau Explorers Ltd., copper-gold prospect in the Chibougamau district, has started to double its shaft depth from 600 to 1200 ft for the purpose of establishing levels at 600, 750, 900 and 1050 ft. Best level to date is at 150 ft, with ore estimated at 507 tons per vertical ft averaging 0.96% copper and 0.46 oz gold per ton. Volume on the 300 and 450-ft levels has been lower in tonnage and fractionally lower in grade. Consideration is now being given to production plans and the company's capitalization is being increased by 1-million shares to provide additional capital.

A substantial increase over previous estimates is shown by latest ore reserve calculations by Campbell Chibougamau Mines, moving forward steadily on its way to production by the spring of 1955. Reserves above the 1150-ft horizon are now estimated 3,050,000 tons with metal content of 158.7-million lb of copper and 245,500 oz of gold.

Most important orebody is the "A," with 1.7-million tons averaging 3.25% copper and 0.12 oz gold; and a new factor of significance is that this deposit has recently been proved by deep drilling to continue with unchanged tenor down to at least the 1300-ft horizon.

A milepost of importance was passed recently when the final spike was driven on the railroad from Seven Islands on the St. Lawrence to the iron ore deposits of Knob Lake on the Labrador-Quebec boundary. Almost a year was lopped off the original time estimate, and start of production by Iron Ore Company of Canada was thus virtually assured for this year.

Total shipments in 1954 will be not more than a token amount, as a great deal of ballasting, dock building, and other preparatory work remains to be done, but it now looks as though the

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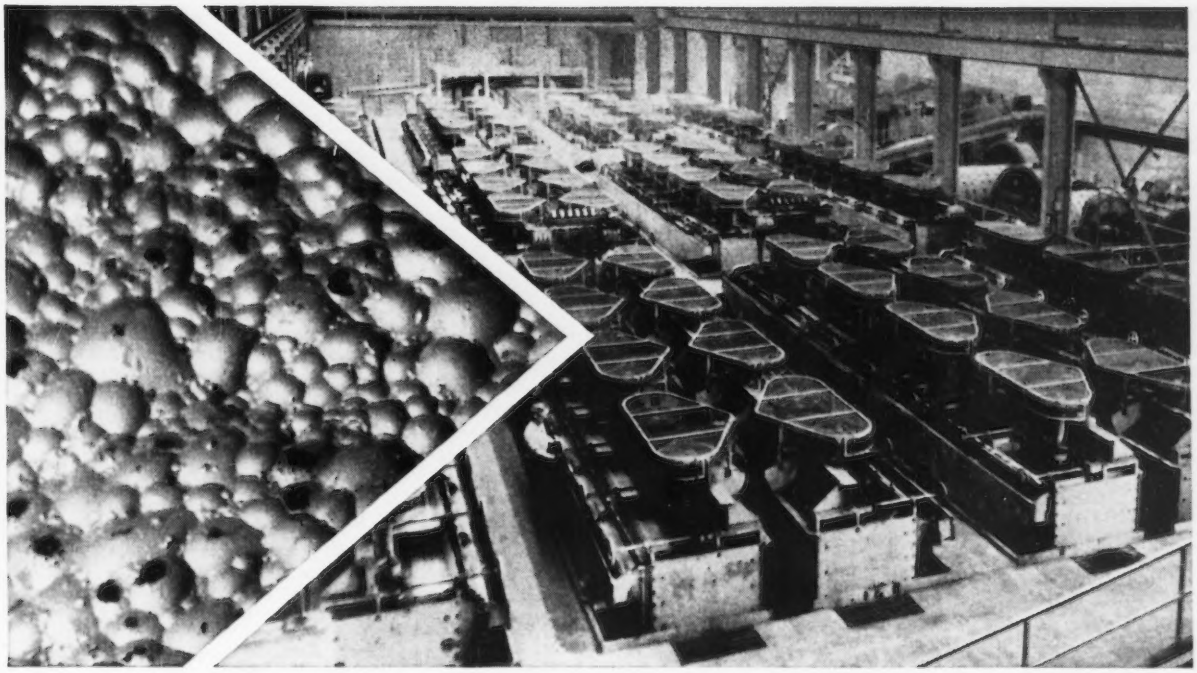

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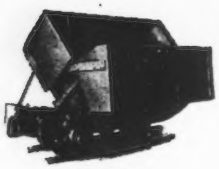

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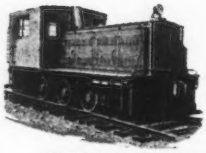

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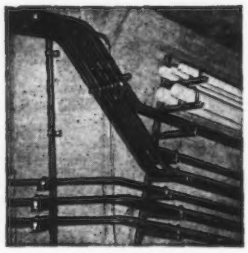

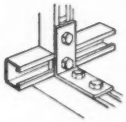

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Quebec *(Continued)*

objective of 10-million tons annually will be achieved without difficulty by 1956 or 1957.

Best drill core ever to be pulled in the Malartic camp has given additional sparkle to the East Malartic depth picture; an exploratory horizontal hole put out ahead of the crosscut on the new bottom 19th level showing a core length of 100 ft that averages close to 0.5 oz gold per ton cut grade. True width will be slightly less. Possible significance of the intersection lies in the fact that East Malartic's mine grade has been slightly below 0.2 oz, while the big new orebody in which the intersection lies, and which has given the mine a new lease on life, has been considered to have a grade potential of about 0.3 oz.

ONTARIO

Surface drilling continues to expand the ore picture at the Manitouwadge property of Geco Mines, and it appears certain that a copper-zinc producer with minimum milling capacity of 4000 tons or so per day is indicated.

No official tonnage estimates have been issued yet, but the main orebody (the west deposit, richer in copper) can easily be calculated to have volume of 14,000 tons per vertical ft, or 7-million tons above the 500-ft horizon. The most westerly hole, No. 21, was one of the best, showing true width of 280 ft averaging 2.28% copper and 0.91 oz silver per ton.

Substantial interests in Geco are held by Consolidated Howey, Noranda Mines, and Mining Corporation.

More than 70 companies now hold ground in Manitouwadge, and many square miles of ground have been solidly staked. Without doubt, the coming season will see more exploratory work in progress that has been witnessed by any Ontario area for many a year.

Apart from Geco Mines, at least two companies has secured ore indications in drilling by mid-March; good, though relatively narrow copper-zinc intersections having been pulled by both Willroy Mines and Lun-Echo Mines. It was estimated at that time that upwards of $6-million of new capital had been raised for work in the area.

Underground operations are being started by Algom Uranium Mines on its Quirke Lake property in the Blind River Uranium area. A 5-compartment shaft, capable of handling 2000 tons daily, is being sunk to an initial depth of 550 ft, to open levels at the 250- and 450-ft horizons. The job will take close to a year to complete.

Drilling has shown the uranium-bearing conglomerates to extend for more than 7800 ft on the Algom ground, with both ends open. Volume can be estimated several ways, depending on grade. Taking 0.9% U_3O_8 as the cut-off point ($13.05 at $7.25 per lb of contained U_3O_8) the estimate shows 1.7-million tons to a slope depth of 250 ft, and no

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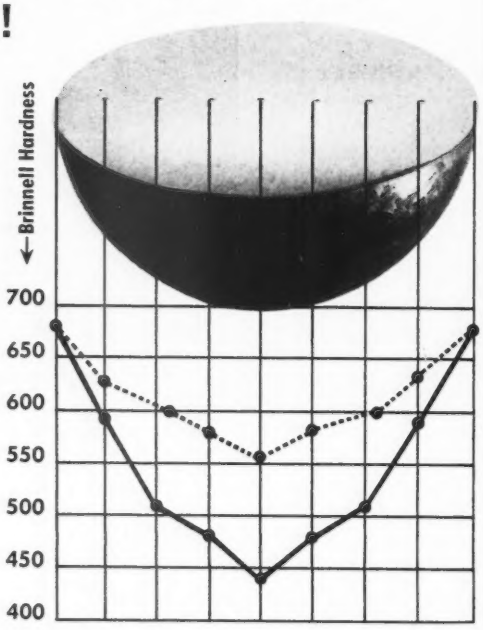

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AFCO PRODUCTS

Ontario *(Continued)*

change of width or grade has been noted in the limited drilling which has been done in some sections to 850 ft.

As with all potential uranium producers in Canada the question mark concerns the uranium oxide price. The $7.25 price, set several years ago, is assured until 1962 at least; but it is now pretty certain that higher prices will be paid to most companies the amount in each case to be set by circumstances.

Ontario's other new uranium area, near Bancroft in the southeast section, also is witnessing expanded activity, the two most advanced prospects being Centre Lake Uranium Mines and Faraday Uranium Mines.

Centre Lake is starting shaft sinking to open a second level 125 ft below the adit horizon. Indicated ore to depth of 500 ft looks like 1.1-million tons averaging 0.10% uranium oxide.

On the Faraday Uranium property, where underground exploration is also being planned, surface work and drilling has disclosed a length of 1200 ft averaging 0.0424% uranium oxide ($6.09 gross) across averaged width of 69.5 ft. Centre Lake is controlled and financed by Consolidated Ranwick Mines, a Ventures subsidiary, while Faraday Uranium is under the guidance of Pole Star Mines.

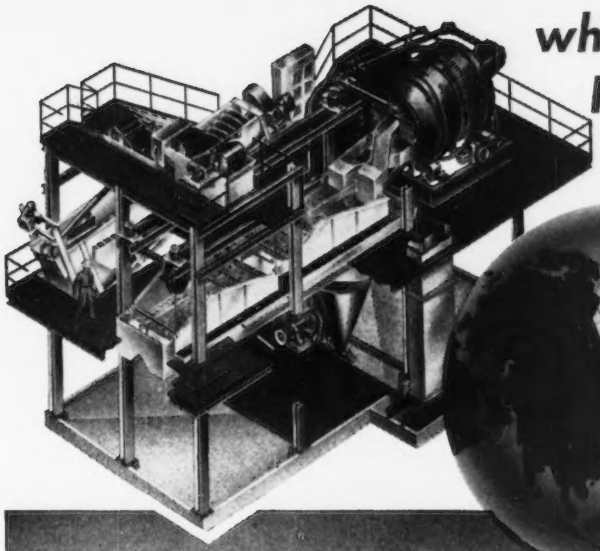
Start of production late this spring is expected by Jardun Mines, with mill construction well advanced on its lead-zinc-silver prospect 18 mi northwest of Sault Ste. Marie. Rated capacity will be 300 tons daily, with initial milling rate of 100 tons visualized.

Deep surface drilling has been in progress through the ice of Windy Lake on the northwest rim of the Sudbury Basin by Chemical Research Corp. on the 938-acre property leased from the Ontario government for $140,000. Regarded as excellent nickel-copper prospecting territory, the bed of the lake had been withdrawn from staking many years ago, but was auctioned during the winter; the remainder of the ground, slightly smaller, was acquired by Falconbridge Nickel Mines for a corresponding price. The leased acreage is in the same part of the basin as the Levack, Hardy, and Fecunis mines.

Canada's newest cobalt producer, Roy Silver mines, has started production. The mine is located in Gowganda, about 7 mi from the town of Elk Lake. It is equipped with a 75-100 ton mill, at which a daily rate of 50-75 tons has been established as a starter. The mine is being developed on four levels to 294 ft, and the management estimates ore in sight adequate for two years' milling at the capacity rate.

Capacity of the concentrator has been increased from 10,000-tons to 12,000-tons per day at International Nickel Company of Canada, Ltd.'s Creighton Mine at Copper Cliff.

This was announced by J. Roy Gordon, vice president-general manager of Inco's Canadian Operations. The mill



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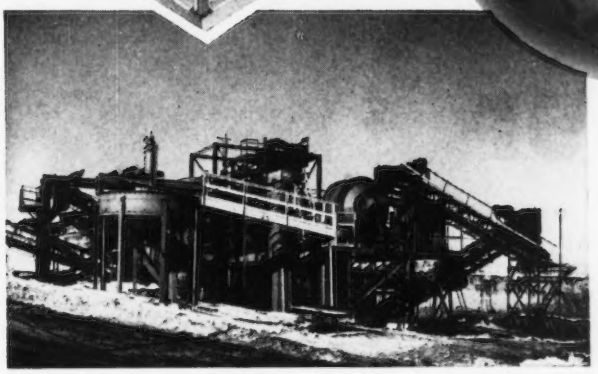

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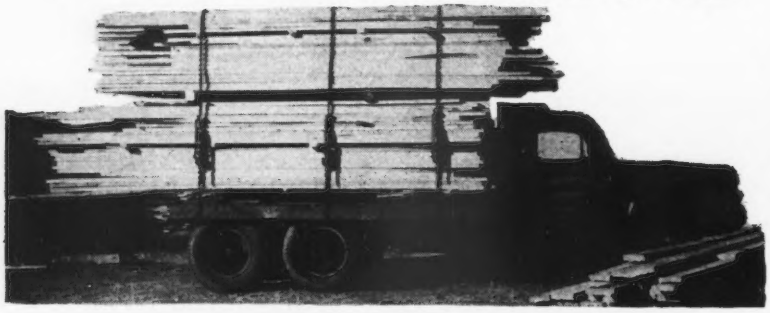

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THE THOMAS LAUGHLIN COMPANY
46 Fore Street, Portland, Maine

Ontario *(Continued)*

building has been enlarged to a length of 465 ft. It is 175 ft wide and 70 ft high. Two crushers have been added to the original four. Thirty-six flotation machines also were added, bringing the total to 180.

Expanded output of nepheline syenite is expected to follow the building of a 15-mi spur line by the Canadian Pacific Railway from Havelock to the mine of American Nepheline Ltd. at Nephton, Eastern Ont. The mine is the Western Hemisphere's only source of the product.

Campbell Red Lake Dome Mines-controlled gold producer of the Red Lake area, is still growing in sturdy fashion. Ore reserves were increased in 1953 despite increased production, and the mill is to be increased to capacity of 750 tons from its present 500-ton rate. In the meantime the shaft has been deepened to 2200 ft, to open eight additional levels.

NORTHWEST TERRITORIES

Giant Yellowknife Gold Mines Ltd. reports a new structure of major dimensions has been determined by recent diamond drilling. The new structure, at latest reports, showed up to 250 ft of shearing and is 3700 ft long and still open at both ends.

Boreal Rare Metals Ltd. has started production with its 100-ton concentrator, and its mill is now being tuned up for capacity production of columbium and tantalum. Ore is obtained by open-pit mining of large pegmatite dikes, reported also to contain important quantities of spondumene and amblygonite.

SASKATCHEWAN

A milestone in the uranium history of Saskatchewan was provided during 1953 by Eldorado Mining & Refining Co., which commenced operations last April. Latest reports indicate a production of 500 tons of uranium ore per day.

Other companies showing concrete promise of becoming uranium producers are Gunnar Gold Mines and Rix Athabaska Uranium Mines.

The Beaverlodge field, only proven uranium field in the province, now holds about eight underground developments (shafts and adits) while the rest of an estimated 80 mining companies in the area are in various stages of surface exploration.

Uranium City, central townsite for the Beaverlodge mining area in northern Saskatchewan, has shown steady growth from its early beginnings in June of 1952. Present population is estimated at about 600 men, women and children. A year ago it was 250. Local residents expect the population may increase to 2000 by the end of 1954.

A few of the private uranium mining

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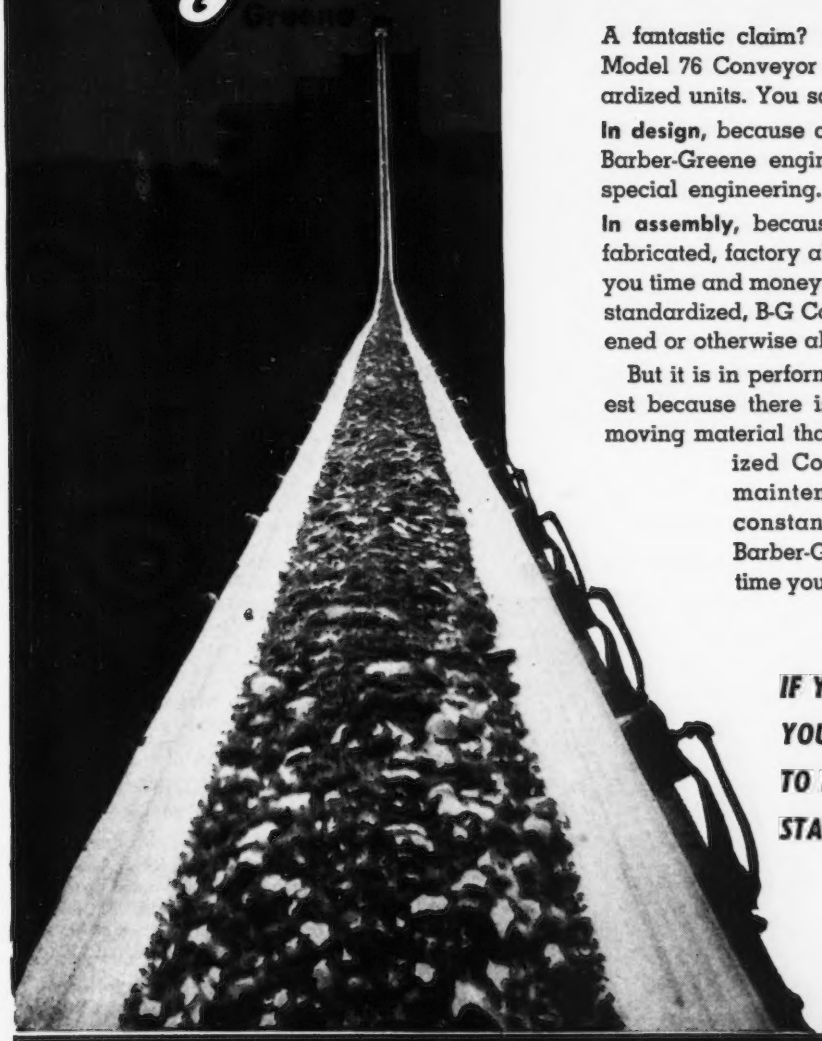
BEFORE IT WENT TO WORK



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Saskatchewan *(Continued)*

companies now working underground at Beaverlodge could be producing uranium-bearing ore today, but Eldorado Mining and Refining, which has the only concentrator plant in the area, will be unable to custom mill ore until later this year.

As a result, the private companies are now concentrating on enlarging their ore reserves. Gunnar Gold Mines has already outlined by diamond drilling close to $100-million worth (gross value) of uranium ore and is now preparing a low cost, open-pit mining operation. The company plans a $7-million capital expenditure to bring it to the mine stage, which may be reached the latter part of 1954. Included in its plans is a huge concentrator plant, with better than 1000 tons-a-day milling capacity, twice that of Eldorado's present capacity.

Hudson Bay Mining & Smelting Co., Saskatchewan's largest producer of metallic minerals, reports that a shaft is being sunk at a new mine in the Birch Lake district, about 10 mi west of Flin Flon.

BRITISH COLUMBIA

Douglas Mining & Development Co, Vancouver, has concluded a $100,000 transaction under which Asbestos Corp. (Exploration) of Canada, Thetford Mines, Quebec, obtained an option on 27 asbestos claims near Hyder, Alaska.

The property is in the Alaska Panhandle, about 1 mi from the British Columbia border. It is at 4000 ft elevation on Ibex Mountain near Stewart at the head of Portland Canal.

Canam Copper Co. announced that at its mining development 130 mi east of Vancouver on the Hope-Princeton highway ore zones have been intersected on the new 10th level about 1100 ft below the surface outcrops.

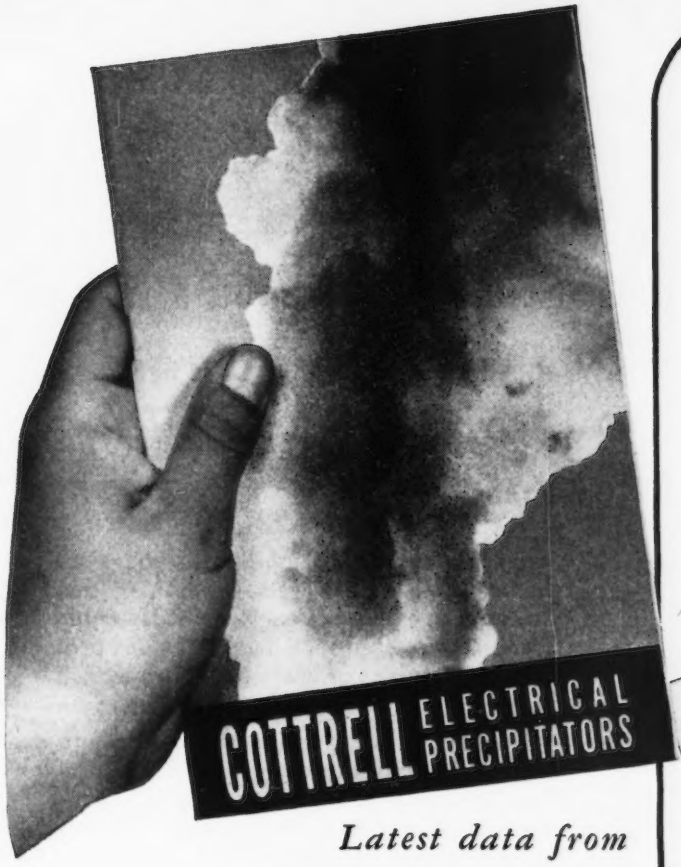
Yankee Dundee Mines Ltd., a gold, silver and base metals property at Ymir, near Nelson, has obtained a diamond drill intersection of 8 ft of obvious ore at a length of 60 ft from the face of Wildhorse tunnel, some 4500 ft from the portal.

Shareholders of Hamil Silver Lead Mines Ltd., which own a base-metal property at Argenta, have been advised that the company has obtained five leases of uranium-bearing ground on the Colorado Plateau, Utah.

Sheep Cheek Gold Mines Ltd. announced that its new 450-ton concentrator near Athalmer is now on tune-up operations.

Allied Mines Ltd. has acquired an interest in what it describes as a valuable uranium property adjoining the Rex Start uranium mine at North Thompson, about 70 mi north of Kamloops.

The company already owns a total of 10 claims, consisting of about 480 acres, in the Kamloops mining district, 18 mi from Louis Creek. They contain silver,



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A copy of this data-packed booklet will be sent free to engineers and other executives interested in recovery processes. Send your request to our nearest office.

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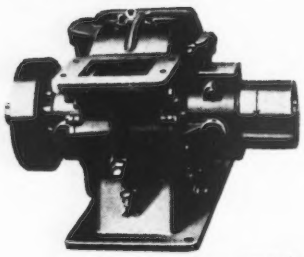

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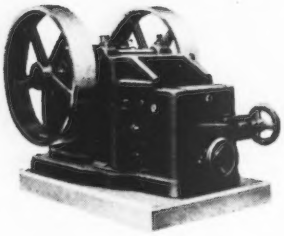

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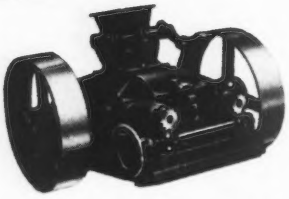

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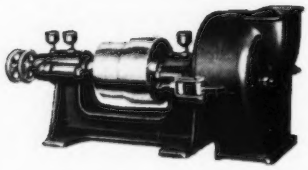

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Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

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IN AFRICA

Central African Federal Minister of Commerce and Industry, Sir Malcolm Barrow, has announced that the Government has decided the Kafue River hydro-electric scheme should precede two other schemes under investigation.

Introducing the hydro-electric power bill in the Federal Assembly, the Minister said the Kafue scheme would need less immediate capital than the Kariba Gorge scheme or the Shire River scheme in Nyasaland. It also would have a reasonable prospect of producing urgently needed power by 1960 and later could be incorporated in the Kariba Gorge scheme on the Zambesi.

The Kafue scheme's first stage could be completed in six years, and the second stage about a year later.

Southern Rhodesia had agreed that the earliest possible construction of the Kafue plant was essential to safeguard the adequate supply of power to the copperbelt and to industries in the Federation.

It was a condition of this agreement that as much as possible of the capital required for the project should be raised from sources other than those normally available to territorial or federal governments. Negotiations for finance would now be undertaken by the Federal Treasury.

The Minister added that electricity for the two Rhodesias, including the copper mines, would create a demand for coal exceeding 4-million tons a year within the next eight years. This was about 50% greater than the present production of Wankie Colliery.

Running-in operations have started at Randfontein Estates' mammoth uranium recovery plant, which is estimated to have ten times the capacity of the original "U" plant at West Rand Cons.

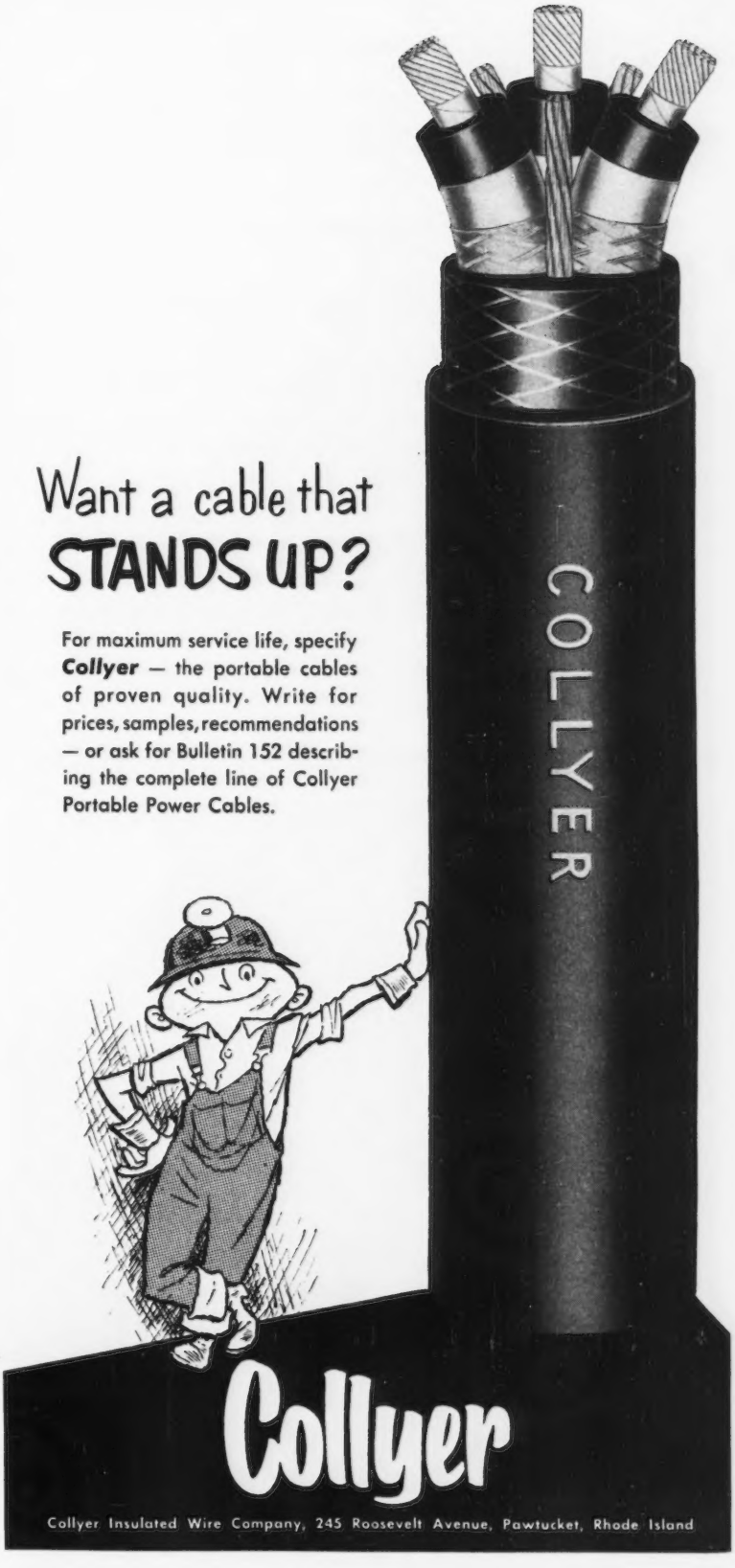
In addition to treating residues from its own gold reduction plant it also will deal with some 20,000 tons of slimes pumped from the adjoining East Champ d'Or Mine. No information is available about uranium grades, but West Rand Cons. monthly profit from uranium recovery is now running in excess of $410,000 a month.

Intensive investigation of the low-grade gold reefs lying to the west of Klerksdorp, following on the decision to advance the Dominion Reefs gold mine over $5.5-million for the erection of a uranium plant.

Dominion Reefs' ore carries around one dwt of gold, making it entirely uneconomic as a gold producer. Several companies have been granted licenses by the Atomic Energy Board to investigate the possible occurrence of economic uranium horizons over a relative wide area.

African mineworkers are to be directly represented when the preliminary talks take place on the advancement of Africans in the Northern Rhodesian industry.

Representatives of the Mine Officials and Salaried Staff Association are also being asked to take part in them. The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Africa *(Continued)*

general secretary of the association states that the members will have to be consulted what their reaction will be to the invitation. issued by the Northern Rhodesian Chamber of Mines, but they were prepared to do their part in trying to solve the whole problem.

Prospecting for base minerals in Southern Rhodesia is increasing. Government permission has been granted to various undertakings to investigate possible deposits of copper, iron, scheelite and associated minerals. Two large companies are reported to be interested in developing tin and lithium deposits.

The Government is following the Union's work on establishing standards for asbestos and is likely to enforce these in respect of Rhodesian production. New producers of chrome are not being encouraged until the direct line to Lourenco Marques is opened next year. Gold mining still is struggling and it is expected that unless working costs drop a subsidy to small mines will be introduced.

Minerals From The Sea

Salvage ship "Twyford" is successfully recovering ingot copper from ships lost off the coast of Southern Africa. The ship expects to "mine" 3000 tons from the "Hannington Court" and the "Klipfontein."

The "Klipfontein," carrying 500 tons, sank in the Mozambique Channel when it struck an uncharted rock about a year ago, and the "Hannington Court," with 2500 tons aboard, was lost off Capetown.

One hundred tons have already been discharged from the "Hannington Court," which is lying upright on the bottom. The decks are being blasted open and the ingots recovered by grabs. Work has been hampered by periodic gales.

Some of the copper aboard the "Klipfontein" originally belonged to American Metals Co., which has interests in the Copperbelt. However, the firm's interest in the metal was liquidated with the collection of insurance from Lloyds of London shortly after the ship was lost.

Deposits of titanium have been discovered at Vila Luisa, 20 mi north of Lourenco Marques, according to a report from Johannesburg.

Afrikander Proprietary Gold Mines Ltd. has acquired an interest in prospecting rights over an area of approximately 49,000 morgen in Gordonia (northwestern Cape). Exploration work is about to commence.

Three miners were killed Feb. 12 by an explosion of dynamite which they were disposing of after it had been damaged by heavy rains which flooded the Mufulira Mine.

Floods resulting from the heavy rains interrupted production at the Copperbelt mine for about a week.

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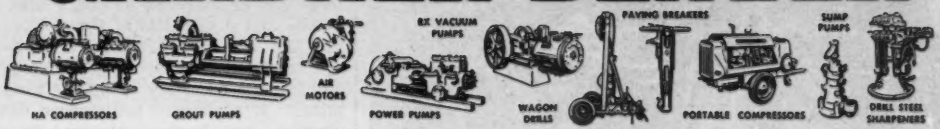

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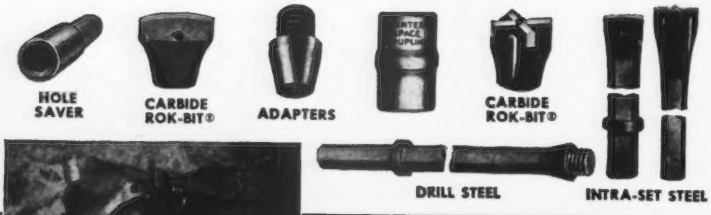

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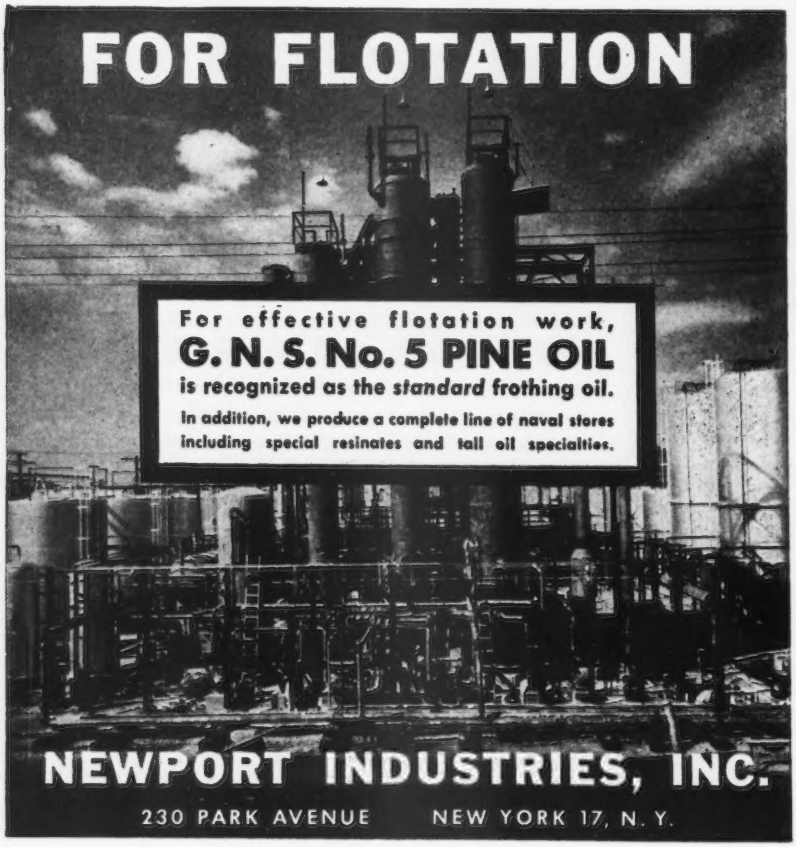
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IN LATIN AMERICA

CHILE

The Chilean government's bill providing a new deal for American copper companies was introduced into Congress on March 3 and is being fiercely debated. Definitive legislation on the subject is expected to open the way for renewal of negotiations between Chile and the U. S. for sales of stocks.

Chile, in the meantime, is a bit apprehensive about potential competition from Rhodesia and the Belgian Congo, fearing the continuing decline in demand for copper and steady increase in production in Africa.

Affected by the proposed legislation are: Anaconda, who operate the Chuquicamata and Potrerillos mines; and Kennecott, whose wholly-owned Braden Copper Company operates El Teniente mine.

Main points covered by the Bill are:

1. **Taxation:** 75% on the net profits based on annual production not exceeding 322,500,000 lb at Chuquicamata; 105,000,000 lb at Potrerillos; and 322,500,000 lb at El Teniente. Should production exceed these basic figures, excess will be taxed at 50%. At present the Government levies taxation on the profits of these mines at: 86.3% at Chuquicamata; 93.1% at Potrerillos; and 86.9% at El Teniente.

2. **Investment:** the companies must invest 20% of net annual profits in Chile for exploration of new mines, development of agriculture and forestry, industrial or other activities.

3. **Production:** should the companies be compelled to cut production because of international developments, the reduction in Chile may not be proportionately greater than that effected at mines operated by these companies in other countries.

4. **Rate of Exchange:** at present the Government has paid the companies 19.37 pesos per dollar (i.e. for operating expenses). The Bank rate is 110 and the free legal rate is 230 pesos per dollar. The companies therefore have had to sell some $80-million yearly to get the necessary pesos. This rate is changed in the Bill to the "Bank rate," i.e. 110 pesos. Should this rate be upped, as appears likely, to 145 to 170 pesos per dollar, the companies would benefit accordingly.

5. **Chilean Copper Institute:** an autonomous, legally incorporated entity is to be created, according to the Bill, to study conditions prevailing in foreign and local copper markets; to check into all phases of the activities of the companies in Chile—production, costs, sales, prices, etc. It shall authorize exports of copper and imports necessary to maintain operations. It shall also sell copper direct when so specifically authorized by the President of Chile. It will check on the welfare and living conditions of the mine workers. The Ministers of Finance, Economy and Mining are to be permanent directors of the Institute.

Total unsold stocks of copper as of the beginning of March amounted to 160,000

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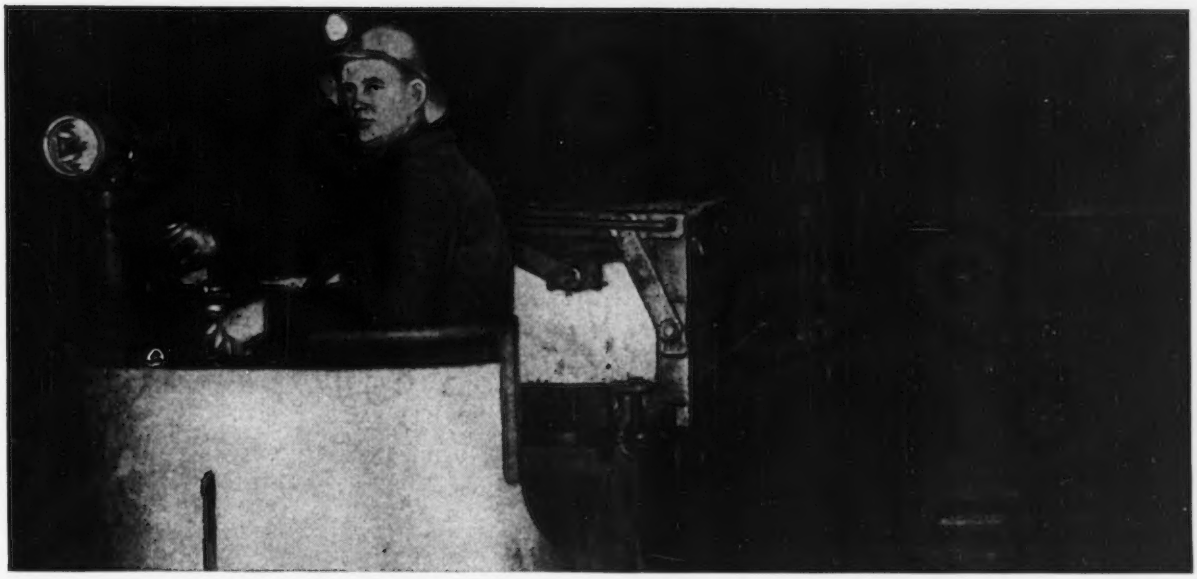

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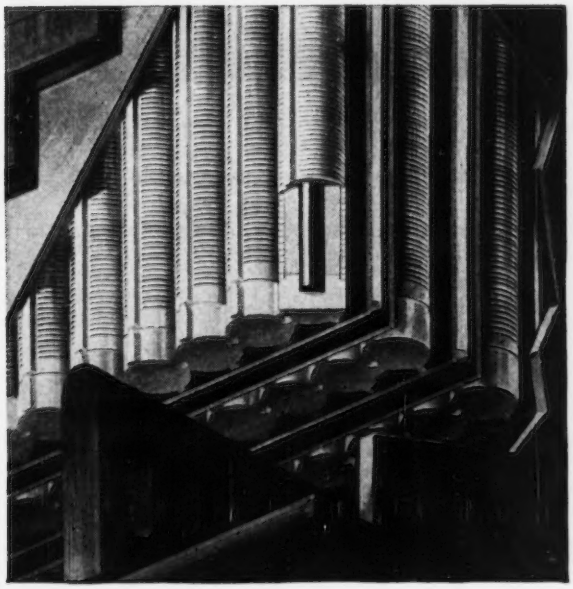

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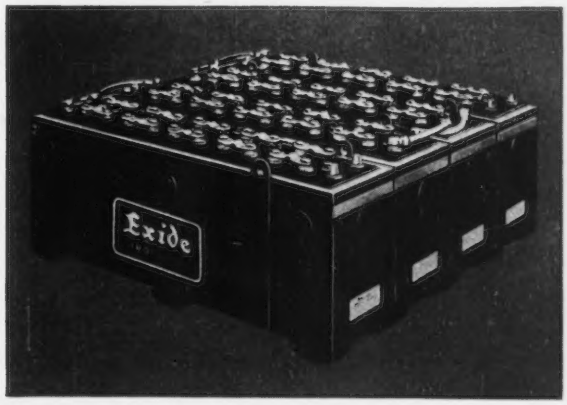

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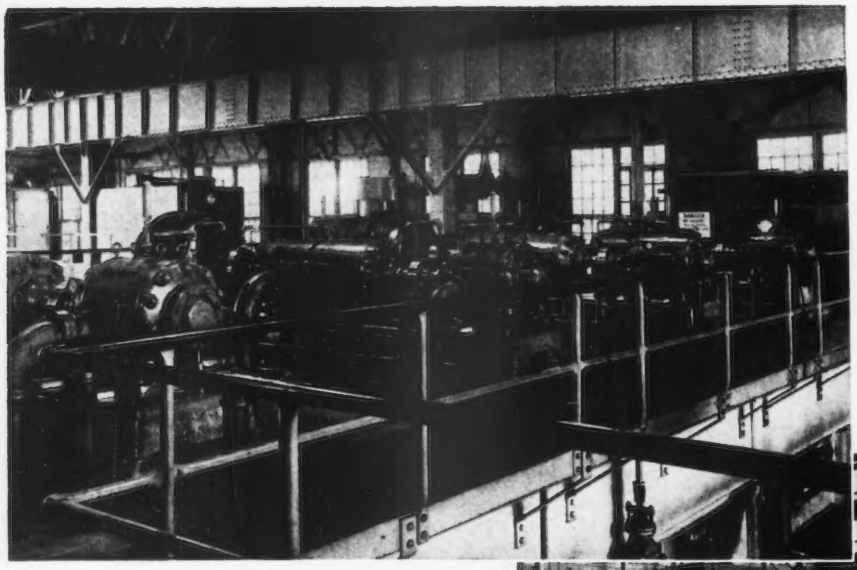

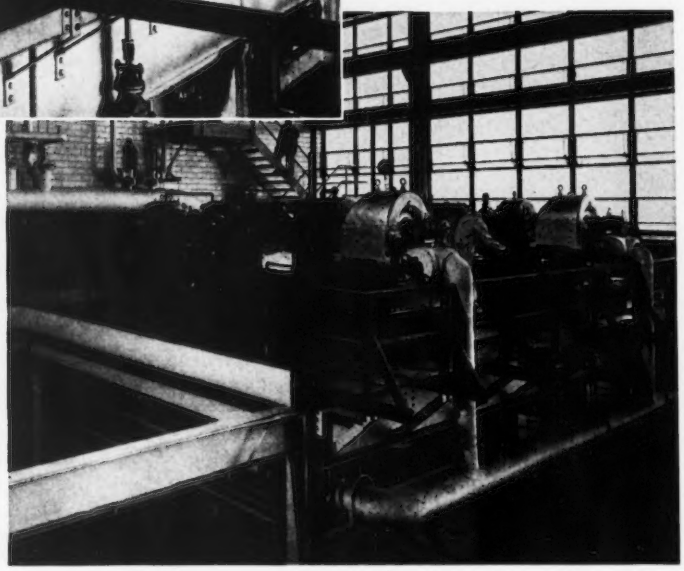

Views of Fuller Rotaries installed on balconies; overhead, out of the way. Left: Four two-stage; capacity each 1665 c.f.m., 100-lb. psig. Below: Two two-stage; capacity each 1592 c.f.m., 120-lb. psig.

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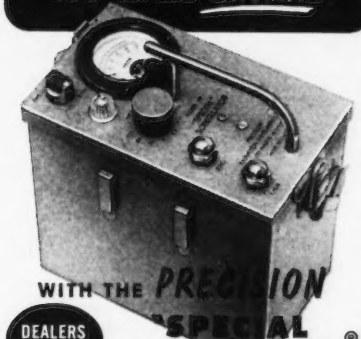

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Chile *(Continued)*

long tons. The Government in early March was paying the producing companies 23.854c per lb for electrolytic, and 23.525c per lb for fire refined, f.o.b. loading ports. The profit made by the companies on this basis (difference between total costs and the price paid by the Government will be assessed a tax of 60%. The difference between what the Fiscus paid and the eventual selling price of these stocks goes 100% to the Government.

The Government calculates that present operating costs are: Chuquicamata 14.990c per lb; Potrerillos 19.041c per lb; El Teniente 14.556c per lb.

MEXICO

Expropriation or any other form of nationalization for mining is not even contemplated by the Government. Ing. Constantino Perez Duarte, Sub-secretary of National Economy made that plain during talks with Chihuahua mining men while he was examining the Chihuahua mining stiuation which he admitted is bad (most small mines there have closed because of low lead-zinc prices).

Expropriation talk was provoked by the request to President Adolfo Ruiz Cortines by miners union chiefs that he order expropriation of American Smelting & Refining Co.'s Angangueo unit, Michoacan, which the company contemplates closing due to losses from the explosion-fire in its La Dolores silver mine last April 25 and operation difficulties.

The union chiefs also asked expropriation of copper mines at Santa Rosalia, Baja California, that the French-owned Cia. Minera El Boleo quit working after 80 yr because of exhaustion of rich ore. Both camps face economic ruin if their mining dies, the laborites assured the President. He ordered a Government investigation. The chiefs were headed by Luis Quiroz Islas; Secretary General, and Enrique Rangel, Labor Secretary.

The miners union opposed Asarco's application for permission to dismiss 224 of the 1,300 unionists at its Avalos unit, Chihuahua. Asarco cites low lead-zinc prices as the reason for the need to pare personnel.

A manganese boom is under way in the Nochistlan District, Oaxaca, the Ministry of National Economy announced. Manganeso del Centro currently is shipping four carloads weekly; the Cia. Minera Totocuno is moving six carloads a week, and the Cia. Villa Alta y Anexas is busy, though on a lesser but unspecified scale, the report said.

Manganese mines in this area are at San Miguel Chicahua, Santiago, Ixtaltepec, Perales, Amatlan, Chachoapan, San Pedro Cantaros and Santiago Huaclila. The agency added that Maurice Minchen U.S. mining man, filed with it applications for work rights to 100 tracts of 225 acres each in the Pochutla Zone, Oaxaca, to mine gold, silver, copper and titanium.

Guerrero Government seeks to advance

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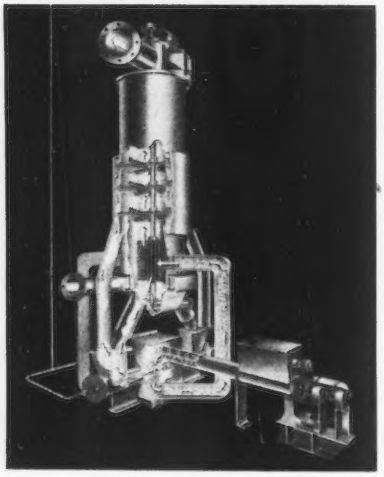

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Mexico *(Continued)*

mining, particularly along the teeming tropical Guerrero Pacific coast. It has commissioned Dr. Agustin Gallegos Essuivel, chemist, to examine metal-mineral deposits there to ascertain the feasibility of exploiting them, either directly by the State Goverment or by Government-aided private enterprise.

The Federal and Durango Governments are to jointly establish a foundry at an estimated cost of 306-million pesos ($35,110,000) for further exploitation of Mexico's famous iron mountain, the Cerro del Mercado, near Durango City, which has been worked for more than 100 yr. Investment includes transportation services to and from the mountain.

Federal Government's part of the deal is in charge of its fiscal agency, the Nacional Financiera. Mexican and foreign technicians, among the latter Americans and Germans, are perfecting plans, the Financiera said. The foundry will have a 300,000-ton annual capacity, figures to be ample to correct the 4% yearly deficit Mexico has in iron for home uses.

Revised edition of a 190-page book on the *Mining Laws of Mexico* has been published in English in Mexico City.

The book includes translation of all mining laws and amendments enacted by the Mexican National Congress up to June 30, 1953, as well as executive decrees and rulings.

Included are the provisions on mine safety, prospecting, reserves, sampling, taxes of the Mexican government.

Publisher is Publicidad Tecnica, Balderas 44, Office 402, Mexico D. F. The book was prepared by Pablo Escalante.

BRAZIL

Contract for 135-mi jungle railroad and port facilities to serve the Serra do Navio manganese deposits in the Federal Territory of Amapa has been awarded to Foley Brothers Inc., Pleasantville, N. Y. Railway, to be three years in construction, will link the mines with port installations on the north bank of the Amazon River, near Macapa.

ARGENTINA

Pig iron production at Palpala, Jujuy, will be duplicated with the new blast furnace to be installed by Fabricaciones Militares. Puesto Viego mine, near Zapla, has been prepared and equipped and is ready for the increase in ore demands.

Compania Minera El Aguilar has begun sinking a three compartment shaft 200 meters deep from level B.

Mine is working at full capacity and plant is milling at the rate of 1000 tons per day. Projects for better mechanization and efficiency are under way and labor relations have improved a lot recently.

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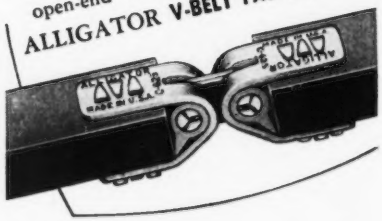

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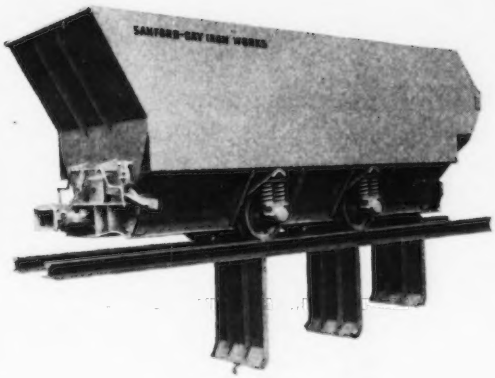
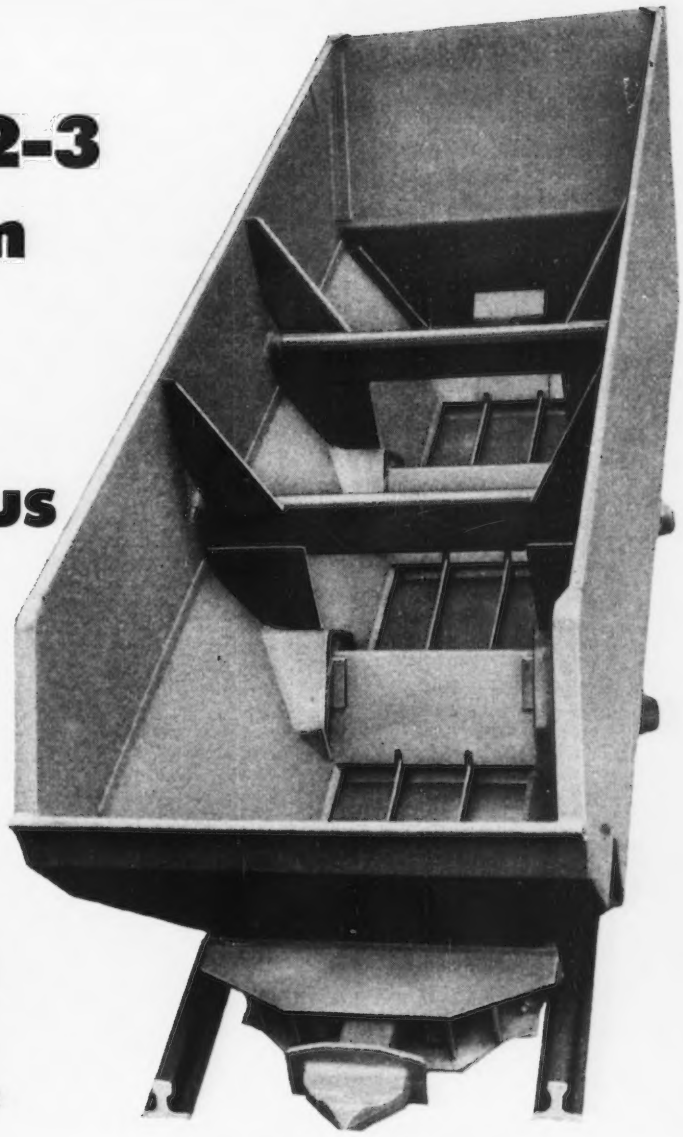
New S-D 1-2-3 Drop Bottom Automatics to haul diatomaceous earth

Non-Stop!





Bottom of this S-D Drop Bottom Automatic is completely sealed against dust leakage.

This is one of the new S-D 1-2-3 Automatic Bottom Dumping Mine Cars just completed to haul diatomaceous earth, non-stop, at an underground mining operation in California. Twelve of these cars are to be coupled together in train. They will be loaded selectively from glory holes and haul load to underground bins where they will dump on-the-move, then return for reloading.

These cars were selected in a modernization program to speed haulage and reduce costs. They are to replace gable type cars. In this particular operation, the S-D 1-2-3 Automatics offered these needed advantages: (1) They will fill bins completely. Doors on these cars open in order (1-2-3) as the car moves over the bin and will fill the bin to track level. (2) They will eliminate the worst of a bad dust problem because S-D Automatics do not dump, they lay their load down. This also means better blending of material. By laying the material in the bin on-the-move, S-D Automatics eliminate spot dumping. (3) They will haul maximum capacity loads. Short 12-car trains required big tonnage cars. The capacity of each of these S-D Automatics is 322 cu. ft. (4) They will speed-up haulage because S-D Automatics dump on-the-move and, in addition, this particular car has overlapping ends to avoid costly track cleanup caused by spillage between cars when loading in train. (5) Furthermore, these cars are completely sealed against all dust leakage. Track cleanup is practically eliminated. Cars are equipped with automatic couplers and spring-mounted trucks. S-D Automatics can be built in the size and design to meet your requirements. This particular car is approximately 6 feet high, 5 feet wide and 15'6" long. For complete information on S-D Automatics, write us today.

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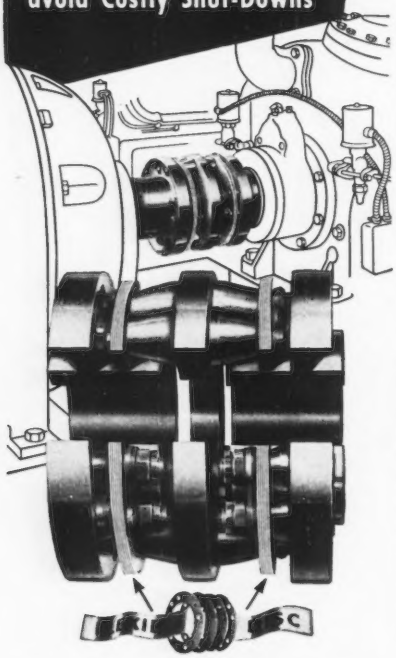

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NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
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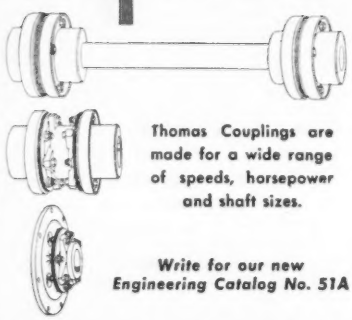
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



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Argentina *(Continued)*

mica buys any kind of uranium ore of domestic production from 0.20% U_3O_8 and up. One percent ore is paid 400 pesos per ton. Some small mines in San Luis and Mendoza have started deliveries of small lots. At the same time the Comision is mining uranium ore in Mendoza, near Malargue, and in San Santiago in the province of La Rioja where uranium appears together with nickel.

PERU

Exploration is underway at the Acari iron ore deposits for which Republic Steel Corp. in December signed an option with Pan American Commodities, S. A., of Lima.

The option was for exploration and development of 30,000 hectares of potential iron deposits in the Andean foothills just above the Acari River valley. Area of exploration is some 38 mi east of the 600 sq km iron ore concession being developed by Marcona Mining Co. (see *E&MJ*, January 1954, p 85).

Republic Steel Corp. has contracted with Utah Construction Co. to carry out exploratory diamond drilling and tunneling in the Acari area. First 90 meter drill-hole completed in early February reportedly showed iron values in excess of 65%. Drilling site is located between 2000 and 3000 ft elevation.

BRITISH GUIANA

British Guiana Consolidated Goldfields Ltd. is to explore a 75,000-acre columbite concession vacated by the Kennametal International (South America) Co., according to J. R. Robinson, chairman of B. G. Consolidated. Preliminary work, he said, would be carried out in Mazaruni, one of the colony's richest mining districts.

Kennametal abandoned its mining venture after eight months of prospecting as it was proving uneconomical, Robinson said. A new company would find the project difficult but his company was already operating here and, not being faced with heavy initial expenses, should find the venture successful.

PUERTO RICO

Confirmed iron ore sources on this country's beaches and dunes have led Teodoro Moscoso Jr., administrator, Economic Development Administration, to point to the possibility of Puerto Rico's having the first steel mill in the Caribbean area.

The iron showings resulted from a joint study by United States Geological Survey and Moscoso's EDA.

VENEZUELA

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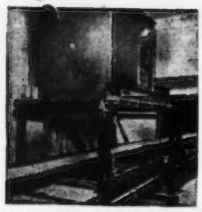

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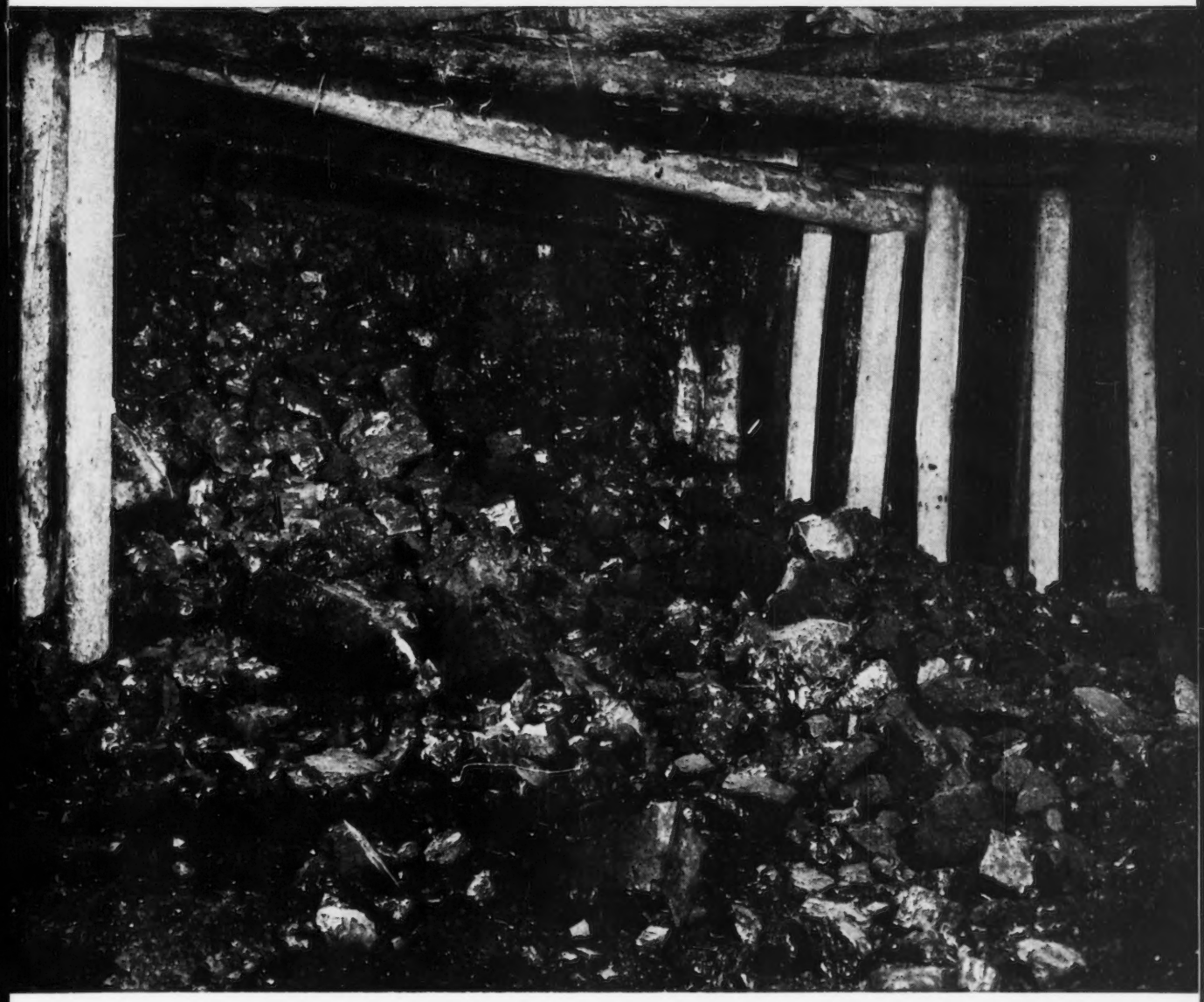
WHERE EXPLOSIVES RESEARCH PAYS OFF



About 487,000,000 tons of coal were mined last year to provide fuel for America's electric utilities, coke ovens for producing steel and cement, and railroads. Mining that tonnage economically and efficiently required nearly a quarter billion pounds of industrial explosives.

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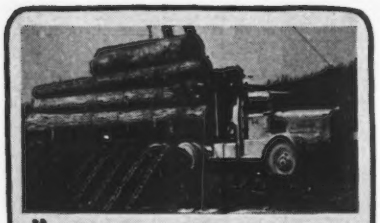

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Venezuela *(Continued)*

has flown to Santa Elena de Uairén in the Gran Sabana of the state of Bolívar to appraise current production methods.

Diamond production in Venezuela for 1953 was slightly under 20,000 carats, and the commission hopes its findings may lead to an increase which, within a few years, can double the 1953 figure.

AUSTRALIA

National Lead Co. announced March 4 that it had received concessions from the Australian goverment to explore a large area in the northern part of the Continent.

The regions to be explored have shown indications that they might contain ores of copper, nickel, lead and zinc. Operations are being carried out by the company's Australian subsidiary, Titanium Alloy Manufacturing Company Pty. Ltd.

At the present time, National Lead Co. mines and exports rutile and zircon ores from properties on the eastern coast of Australia.

New developments concerning uranium continue to attract the interest of mining circles in Australia and it is expected that following the May 1954 General Parliamentary elections a summing up of achievements and elaboration of new plans will be arranged by the then Government in power.

In the meantime, first reports have been released of what is claimed to be a new uranium strike, almost as rich as the Northern Territory's fabulous Rum Jungle field. The newly-discovered deposits are near Chillagoe in North Queensland and three uranium outcrops have been located in that area.

Preliminary assays have reportedly shown values of between 5% and 10% uranium content in the ore. The Yeoman's Syndicate, which is responsible for the new discovery, is closely linked with two overseas-controlled companies, Placer Development and Bulolo Gold Dredging Ltd.

Uranium bearing materials have been also discovered near Tenterfield in the New England area of New South Wales. A company to be named Australian Uranium Company is to be created to develop leases covering several thousand acres and prospecting would be extended in the near future.

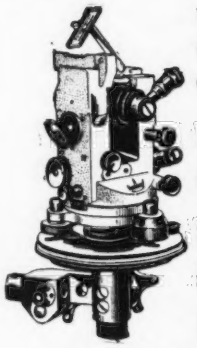
The Government Bureau of Mineral Resources had confirmed that the radioactivity of the samples from this area was caused by the presence of uranium.

Small-scale mining operations have started on the Myponga uranium fields in South Australia where strict security blackout has been imposed by the South Australian Government.

It is understood that testing of samples is still proceeding but that the Government is already placing a considerable deal of confidence in the future of this reportedly rich field. The South Australian authorities are still working actively on the development of their Radium Hill uranium deposits and the development is

ASKANIA

MINING THEODOLITE



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PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

Australia *(Continued)*

financed, among others, by the U. S. Export-Import Bank. It is hoped that the bank's assistance will be also available for the eventual exploration of Myponga uranium deposits.

West Australian Uranium N.L. is being formed to take over activities at Lake Dundas and Ravensthorpe. Shallow trenches at Dundas have disclosed uranium-bearing materials continuously over some 1000 ft. Equipment for a power shovel to deepen the trenches is expected in the near future. The churn drill in the lake has reached 121 ft in carbonaceous material and should strike bedrock within 100 ft. More holes will then be drilled nearer the lake's edge. There is also a 300-acre claim in the Ravensthorpe copper field where uranium bearing minerals have been found.

Uranium Development & Prospecting N.L. had an encouraging report of "sulphides with the count" at the depth of 50 ft. In the Edith River area this company has now a number of important leases. The Bureau of Mineral Resources had rigged diamond drills on leases No. 3 and 9 and had started drilling to intersect the lode at 150-ft depth. Shaft on No. 4 lease was at 47 ft when the orebody was still strong in the shaft.

Australian mining experts expect a great increase in uranium mining and exploration activities to follow the completion of the first treatment plant at Rum Jungle. This is scheduled to take place sometime in July 1954 and will encourage activities in the Northern Territory. The advent of seasonal weather has also hampered most of the prospecting efforts and a resumption of large scale is being prepared by a score of companies.

Increases in its output of silver and copper were reported by Mt. Lyell Mining for the quarter ending Dec. 31. Copper output rose from 2491 tons to 2584 tons and silver from 7271 oz to 10,426 oz. There was a slight drop in ore treated, from 374,158 tons to 371,700 tons.

Australian gold output is still running at a level about 9% above previous year's figures but it is understood that further increases in output are unlikely. Mining interest is now concentrating on uranium and to certain extent on oil search and the nominal premium now obtainable for Australian gold in free markets meant bad times for marginal producers. Australian production of gold is still about 30% below prewar figures.

After a comparatively easy manpower situation, many mining contractors are reporting difficulties in securing skilled and unskilled labor and wages are again moving upwards, although at a very moderat: rate. More of the marginal producers are again threatened by the rise in costs and fall in many prices of metals.

Better market for Australian zircon and rutile is expected to lead to the resumption of some postponed expansion programs, but uneasy future of this Australian industry will mean a considerably smaller expansion program. Main buyers

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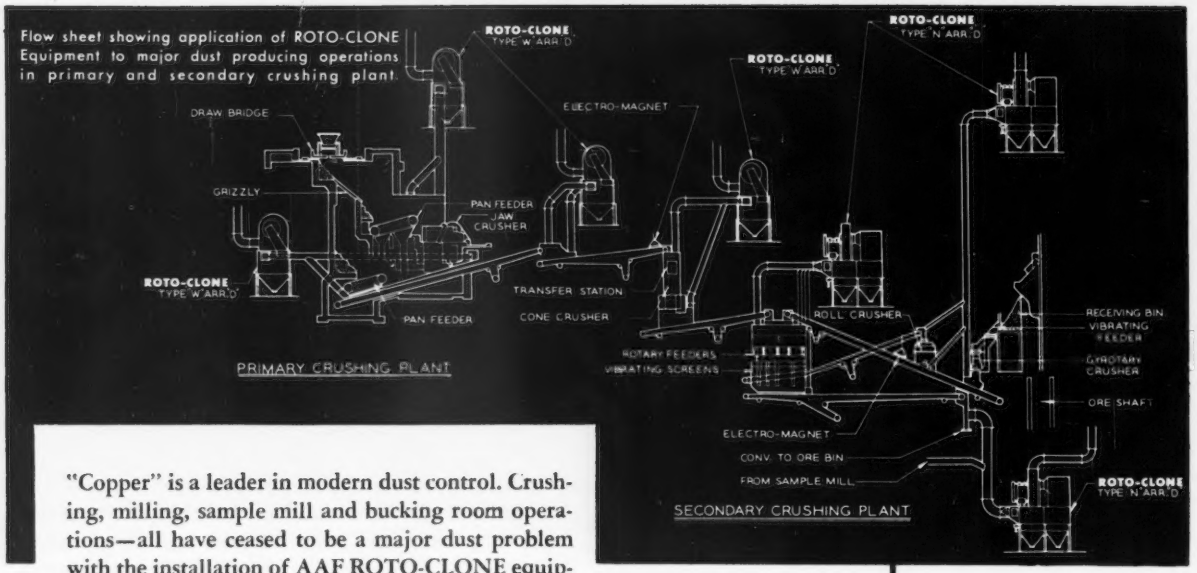
Betters Industrial Relations — Reduces Labor Turnover

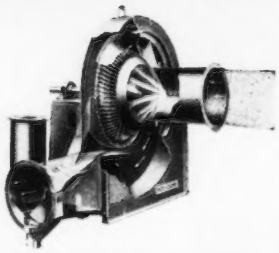


"Copper" is a leader in modern dust control. Crushing, milling, sample mill and bucking room operations—all have ceased to be a major dust problem with the installation of AAF ROTO-CLONE equipment.

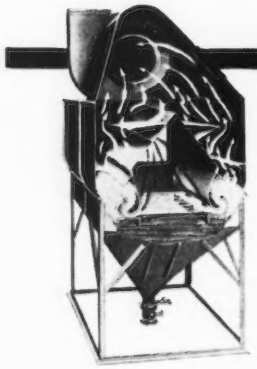
Note the flow sheet above. This primary and secondary crushing plant has a capacity of 900 tons per hour—operates two 8-hour shifts. Dust from all major dust sources is exhausted and collected by four Type W and three Type N ROTO-CLONES. Result—employees enjoy the best of working conditions and nearby homes and hospital are free of any dust nuisance.

ROTO-CLONE was the logical selection for this service because these "wet collectors" (1) assure highest efficiency in the collection of fine dust particles; (2) eliminate abrasion and (3) permit disposal of the collected material as a sludge to prevent a secondary dust problem.

So, we repeat—"Take a tip from the copper companies!" Investigate the many benefits ROTO-CLONE Dust Control can bring to your operations, whether large or small. For complete ROTO-CLONE information, call your local AAF representative or write direct.



Type W ROTO-CLONE—a dynamic precipitator which, by the addition of a moving water film on the collecting surfaces, extends its high cleaning efficiency to the collection of the lightest, finest dust particles.



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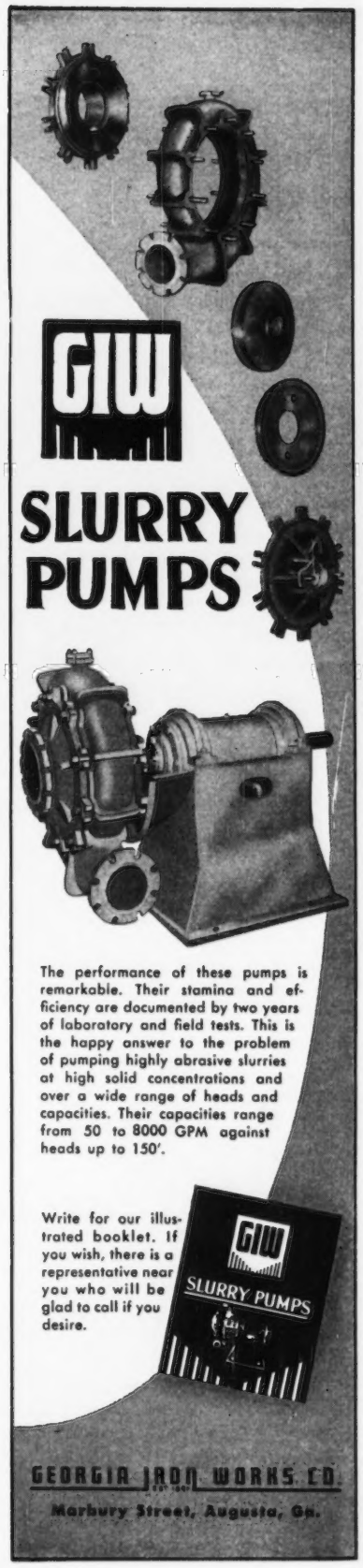
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Australia *(Continued)*

for Australian rutile and zircon are at present the United States, United Kingdom and Japan.

Peko Gold Mines N.L. is preparing its copper treatment plant. Samples are being tested by Dorr Co. of U.S.A. to determine suitability of FluoSolids treatment. In the crushing section of the milling plant all foundations are complete and work is proceeding on the installation of coarse and fine ore bins, four conveyors, the jaw crushers and the gyratory crusher. Progress has been made in the preliminary copper section.

Red Terror Gold Mines N.L. has reported good values in its preliminary exploration activities and the last firing had exposed the start of a new shoot of ore. The east drive is also being extended.

Uranium has been discovered in the New England district of New South Wales, according to the State Mines Minister, F. P. Buckley.

He said geologists had identified the discovery as torbenite-phosphate of copper uranium and added that the discovery sugested that similar finds were possible in a very large part of the State.

IN ASIA

RUSSIA

Many branches of Soviet metal mining reportedly fell short of 1953 goals.

While *Pravda* reported that the Ministry of Metallurgical Industry fulfilled 99% of its 1953 plan, this shortage of 1% was considered to be a serious failure.

Pig iron output rose 9%; zinc, 13%, and lead, 22% last year. Copper output was omitted from the national production summary for the first time in several years. The Russian copper industry, particularly in the Urals area, has been the target of severe attacks recently for failure to meet assigned goals (*E&MJ*, February 1954, p 200).

For metals mentioned, production achievements were discussed exclusively in terms of percentage gains over previous years.

Complaints against Russia's metallurgical industries (*E&MJ*, March 1954, p 178) included the charge that a number of mines and processing plants not only failed to meet government goals for quantity of output but lagged in quality as well.

Neither the ferrous metal nor the nonferrous metal industries fulfilled assignments for reducing production costs, for increasing mechanization of mining operations or for raising worker productivity last year, *Pravda* said.

In addition, new capital invested in mining fell short of government expectancy and plant capacity didn't expand as much as the government thought it should.

Per-ton hauling costs are substantially reduced, when C & D *Slyver-Clad* Batteries supply the muscle. Reason: exclusive C & D Five-Fold plate insulation. *Sedimentation* is virtually eliminated —leaving extra space for longer, heavier plates. Yet there's no increase in over-all battery size!

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MALAYA

Greatly increased costs of production equipment, supplies and prospecting, are a damper on expansion plans of most tin mining companies here, especially as low selling price, high stocks and continued production mean little or no profit.

Yet to maintain the stable industr sought here, it is important to avoid shutdowns. Most companies have had to curtail production, and some are already on standby basis. In some cases this is directly due to working out of ore-bearing ground. There is a real need for further prospecting.

But the emergency in Malaya is holding up prospecting. Outside of enclosed villages curfew regulations bar carrying any food. And although security forces have been detailed to cover some operations, it is impossible to provide real protection, and the prospecting parties still get shot at.

One prospecting difficulty peculiar to this jungle covered terrain is that there are no outcroppings from which to work. Not only does the vegetation impede progress over the ground, but it has, through the centuries, provided a deep organic cover so that borings are the principal means of evaluating available minerals.

Despite these deterrents one European company is already prospecting in the jungle in Perak, and four more are expected to start boring soon in the Teluk Anson area, seeking deposits suitable for dredge operations. While some 12 Chinese companies are to begin prospecting for possible sites for their traditional open pit mines.

December saw twenty new mines opened in Perak, as against six closed, although it is possible that some have an eye on obtaining quotas under the new Tin Agreement of the Geneva Conference, rather than legitimate operations.

Tongkah Harbor Tin's Ronbipon Dredge is being converted to diesel-electric power and should have been running by March. Operations are likely to be difficult due to boulders and hard wash. Their Bidor Dredge is on a "closed down" basis.

South Malayan Tin Dredging, Ltd., has a lease of 39 acres at Chenderiang, and has acquired rights to work 400 acres of State land adjacent to present operations.

Petaling Tin Ltd. has purchased 600 acres of tin-bearing land from adjacent Castlefield Rubber Estate for about $510,000. This is expected to provide work for No. 6 dredge for approximately ten years, probably not starting until 1962.

CHINA

Manganese has been found on Taipa Island, 5 mi from Macao, according to a report from Hongkong. Samples sent from the small island to Hongkong for analysis reportedly showed 50% pure manganese. A leading Hongkong engineering firm is reported as having offered to finance mining operations.

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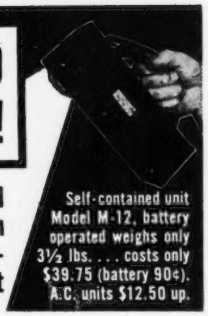

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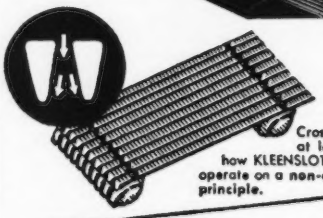

Cross section at left shows how KLEENSLOT Screens operate on a non-clogging principle.

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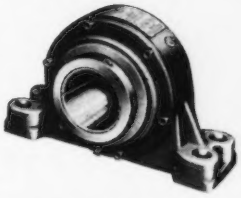

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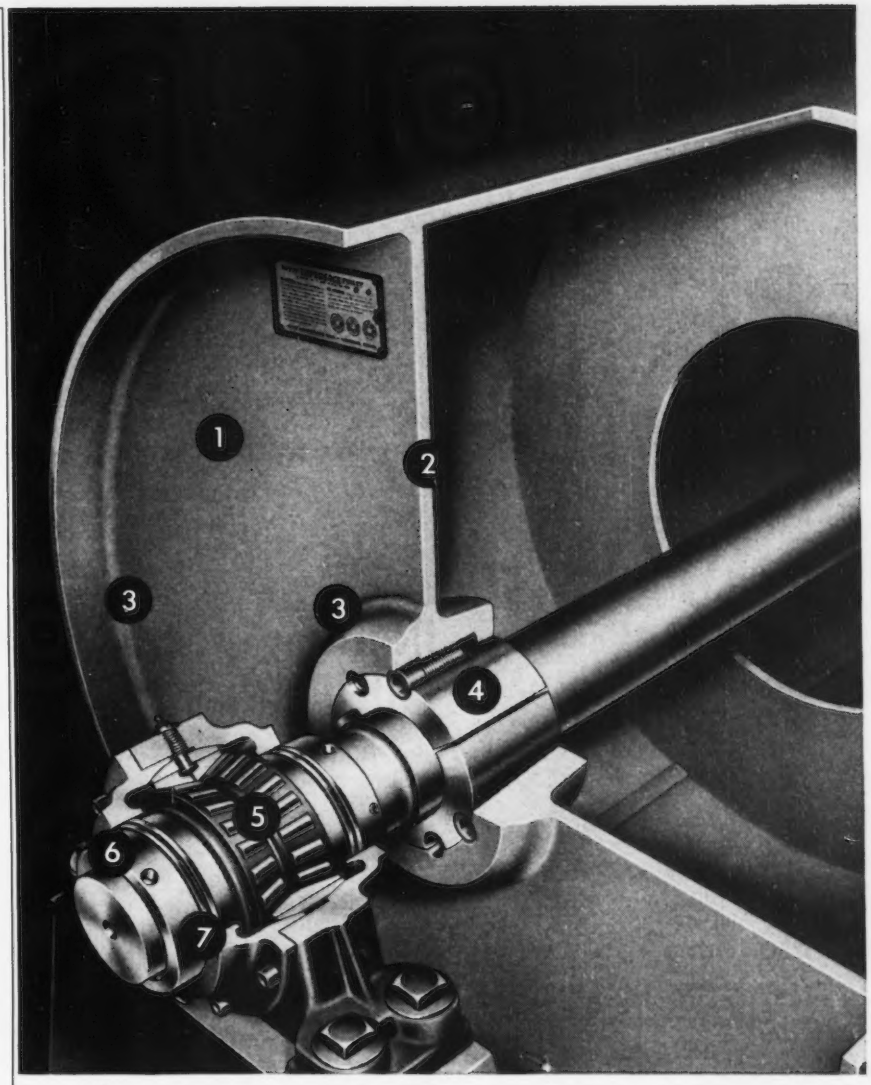

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SYDVARANGER IRON ORE WORKS, at Kirkenes, Norway, which mines magnetic taconite, has announced that the mine, shown above, will soon be complemented by a large scale pelletizing plant. By 1957, the firm hopes to export 500,000 tons of iron ore pellets annually. Sydvaranger produced about 1-million tons of iron ore concentrate in 1953.

IN THE PHILIPPINES

President Magsaysay has announced the appointment of a 9-man committee to study ways of strengthening the declining Philippine gold mining industry. The committee will consider the advisability of the Central Bank issuing currency certificates to mining companies in exchange for gold produced.

These certificates could be sold in the open market to importers of non-essential goods who could use them instead of an import license.

This action followed a statement by Judge John W. Haussermann, president of Benguet Consolidated and Balatoc Mining companies that it was only a question of time before his companies, employing 6888 workers, would be forced to close because of unprofitable operation resulting from labor troubles, high mining costs, and the low gold price. J. H. Marsman, head of the Marsman organization, spoke along the same vein.

Henry Brimo, president of the newly formed Gold Producers group, advocated the gold certificate plan, which while not hailed as a cure-all for the depressed gold mining industry, appeared to offer the chance for improvement. The alternative, he declared, would be for the government to subsidize the industry as was done in Canada and Australia.

An aerial survey of iron ore resources in five P. I. provinces will be made in April to insure an adequate supply of ore for the Philippine steel industry. A contract for conducting it was signed with the British firm of Hunting Geophysics, Ltd. Evaluation of the iron ore possibilities of the area will be possible by newly developed photographic and magnetic equipment mounted in a twin engined plane.

IN EUROPE

FRANCE

Rich uranium deposits reportedly have been found near the village of Lachaux, Puy-de-Dome Department in central France. Commissariat for Atomic Energy commented that the new deposits are richer than others hitherto found in France.

BELGIUM

Construction of buildings for Belgium's first atomic reactor will be begun at Mol-Donk, Antwerp Province, in April. This was disclosed in a talk by M. Van Zeeland, Foreign Minister, in a talk before the Belgian Chamber in Brussels.

NORWAY

Norway's biggest aluminum plant, at Sunndalsora, West Norway, was to start production early in April, but is is not expected that full production will be achieved until next year, owing to delays in completion of the Aura hydro-electric plant which will supply the necessary power.

The Sunndalsora plant will produce about 40,000 tons of aluminum a year, and will therefore almost double the present total Norwegian aluminum output which is about 52,000 tons a year.

Much of the £12,500,000 which the plant is estimated to cost has been provided by an American ECA loan which is to be repaid in the form of aluminum deliveries. The Director-General, Aage W. Owe, estimates that it will be necessary to deliver about 65,000 tons of aluminum over a period of 10 yr to repay the loan. The loan carries interest at 2½%.

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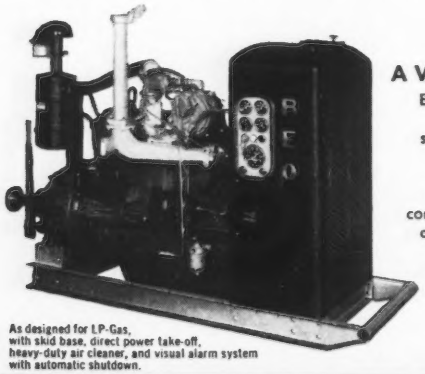

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Letters (*Continued from p 4*)

drothermal solutions to ascend. According to this view, instead of the volatiles or mineral solutions rising up through the magma and being pocketed in the formation above, as Mr. Reinhardt believes, I believe they come from sources deeper down, sources that have been tapped by the upward movement of the stocks and cores. The orebodies would thus, most likely, be near the borders of the stocks and cores.

The data which Mr. Reinhardt uses to support his theory can be used just as well to support (mine) . . . . (and) both show the importance of using the cross sections of mountain ranges as guides.

WILLIAM CROCKER
Prescott, Ariz.

Water Shut-Off

SIR:

In the February 1954 issue of (*Engineering and Mining Journal*, p 35) you describe the new wire line core barrel of the E. J. Longyear Co. Referring to the water shut-off valve feature of this barrel you state: "According to E. J. Longyear Co., this latter feature is of particular importance because, for the first time in the history of diamond core drilling, the human element has been largely eliminated in coring."

(In a write-up of our Duffield core barrel *E&MJ*, November 1946, p 80) you will find this statement: "When the inner tube of the barrel fills with core, or becomes blocked, it pushes the sliding valve back into the sliding valve sleeve, thereby causing a slight increase in water pressure in the drill water line . . . which registers on the gage. . . . Immediately thereafter the cone valve closes . . . causing a pressure increase in the water line, which registers on the gage and notifies the driller to stop drilling."

We believe that our Duffield barrel was the first to apply this principle in diamond drilling.

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The Good Old Days

SIR:

In the process of research in metallurgical process of early days I came across the enclosed card. The date (is) Nov. 29/09 (for one year's subscription to the weekly *Engineering and Mining Journal*, price $5).

REGINALD JOHN MELLOR
Idaho City, Idaho

Ed: *We're grateful to Mr. Mellor for the souvenir of E&MJ's early years and very pleased that he finds its articles still so valuable.*

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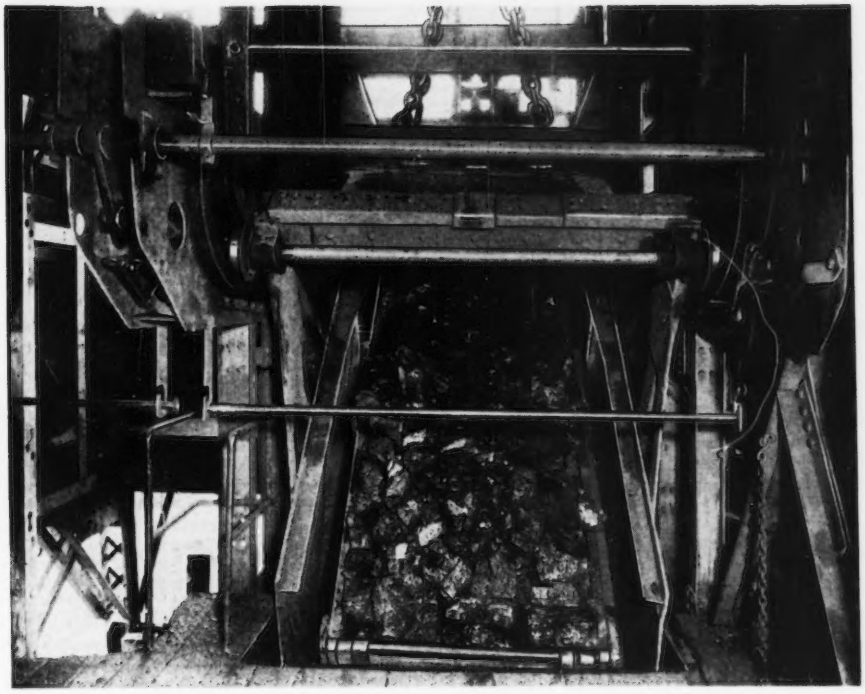

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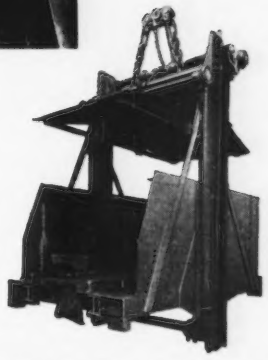

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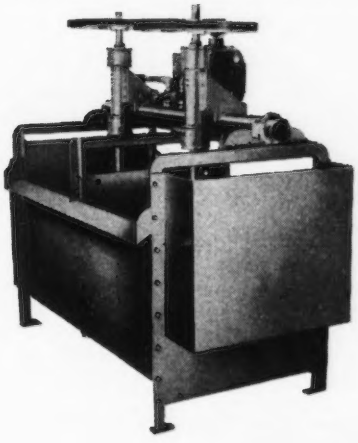
You can choose with assurance..the Flotation Machine so successfully used in mining centers throughout the world

Agitair Flotation is used in so many farflung places because it adapts so readily and efficiently to the varied problems of ore beneficiation encountered in the field of metallurgy. Flexibility is the key to its remarkable success. Its mill application to all basic metals is now engineering routine. Its capacity to meet unusual demands is a challenge it welcomes.



Planned to fit the plant

Cell capacities and connected unit assemblies meet the physical requirements of all mills . . . large or small. Its recovery quotient is high . . . its power consumption low. Simple design and rugged construction insure long, trouble-free use. For complete information on AGITAIR, write your request today.

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Agents In All Principal
Foreign Mining Districts

THE GALIGHER CO.

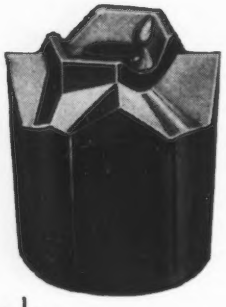
METALLURGICAL DIVISION · THE GALIGHER COMPANY · ENGINEERING SERVICE

CONSULTATION • ORE TESTING
PLANT DESIGN • GEOLOGIC INVESTIGATION

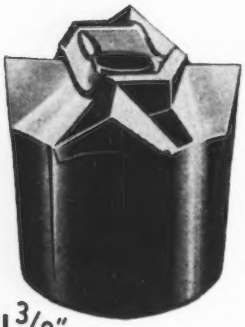
SPEED up ROOF BOLTING with

LIDDICOAT

used to destruction - no resharpening



1 1/4"



1 3/8"

1 5/16"

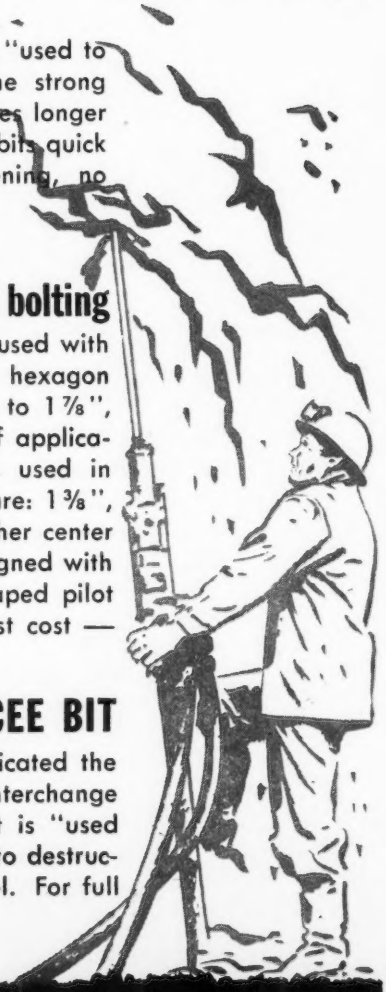
Liddicoat is the detachable bit that is "used to destruction" and then discarded. The strong connection . . . no threads . . . provides longer steel life and makes the changing of bits quick and easy. No delays, no resharpening, no extra costs.

LIDDICOAT
the most popular bit for roof bolting

The type 1-L Liddicoat is successfully used with either 7/8" quarter octagon or 7/8" hexagon drill rods. Made in sizes from 1 1/4" to 1 7/8", LIDDICOAT provides a wide range of application. The three most popular sizes used in drilling for the setting of rock bolts are: 1 3/8", 1 5/16", and 1 1/4" . . . made in either center or side hole. The type 1-L bit is designed with the fast two-stage cutting and V-shaped pilot for rapid collaring of holes. Low first cost — low cost per foot of drilling.

The New LIDDICOAT TEE CEE BIT

Where a Tungsten carbide bit is indicated the TEE CEE is designed for on-the-job interchange with the famed LIDDICOAT bit that is "used to destruction." TEE CEE and "used to destruction" bits both fit the same drill steel. For full details, call on us or write.



WESTERN

Rock Bit Manufacturing Company

552 West 7th South • Salt Lake City 4, Utah

For the Removal of Waste and Water from Sand and Similar Materials

McLanahan SCREW WASHERS

are designed for long service life and lowest maintenance cost

McLanahan Screw Washers—thoroughly proven in service—provide the ultimate in equipment for the efficient, low cost removal of foreign material and water from sand or coarse materials.

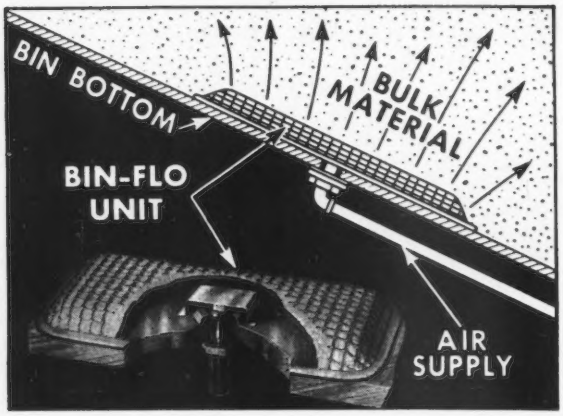
These washers contain many outstanding features, including: antifriction bearings which are easily removed without disassembly—extra large settling area—enclosed reduction drive—flights are cast chilled alloy iron for extreme hardness and resistance to wear.

Washers are available in Single and Double Screw models illustrated—in 20′ and 25′ lengths dependent on moisture content and capacity desired. Investigate today!

Typical installations

McLANAHAN & STONE CORPORATION
Pit, Mine and Quarry Equipment Headquarters Since 1835
Hollidaysburg, Pennsylvania

Write for Bulletin SW-953
This bulletin contains data and drawings on Single and Double Screw Washers. Write for your copy today!



BIN-FLO USES SMALL VOLUME OF AIR AT LOW PRESSURE

KEEPS BULK MATERIALS MOVING

BIN-FLO units in bins, chutes, hoppers, etc., restore flow characteristics to dry, finely ground materials which tend to pack or bridge in storage. Types for all materials and conditions. No moving parts; simple installation; negligible operating cost; no maintenance cost.

BIN-DICATOR bin level indicator—"The Eyes of the Bin"—automatically reports levels of materials in storage; automatically controls filling machines; prevents waste.

NEW 20-PAGE BOOK FREE

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—anywhere!

"We look into the Earth"

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How to keep informed on the

"with what"

part of your business

AT YOUR FINGER TIPS, issue after issue, is one of your richest veins of job information – advertising. You might call it the "with what" type – which dovetails the "how" of the editorial pages. Easy to read, talking your language, geared specifically to the betterment of your business, this is the kind of practical data which may well help you do a job quicker, better – save your company money.

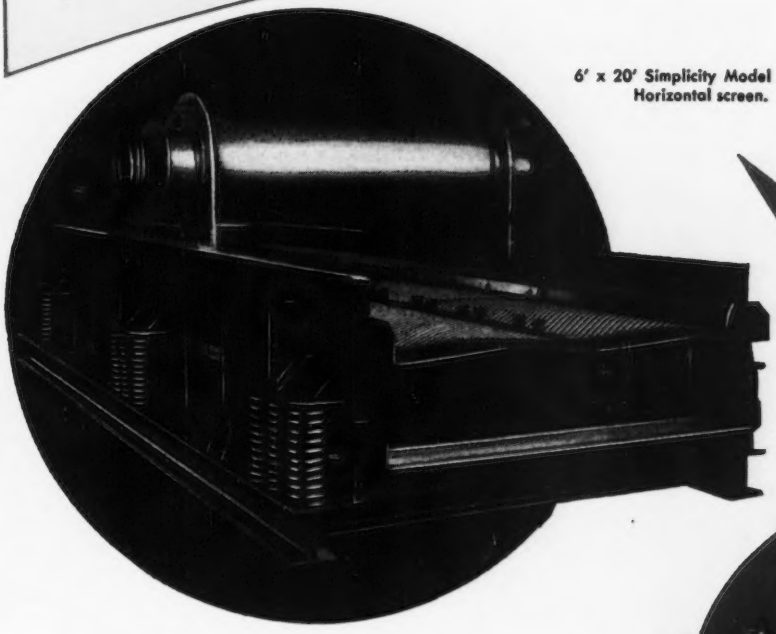
Each advertiser is obviously doing his level best to give you helpful information. By showing, through the advertising pages, how his product or service can benefit *you* and *your* company, he is taking *his* most efficient way toward a sale.

Add up all the advertisers and you've got a gold mine of current, on-the-job information. Yours for the reading are a wealth of data and facts on the very latest in products, services, tools . . . product developments, materials, processes, methods.

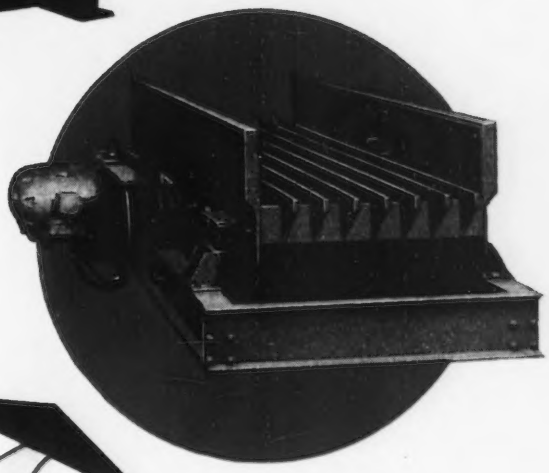
You, too, have a big stake in the advertising pages. Read them regularly, carefully to keep job-informed on the "with what" part of your business.

McGRAW-HILL PUBLICATIONS

SIMPLICITY SCREENS make short work of processing operations in metal mining



6' x 20' Simplicity Model "OM" Horizontal screen.



Simplicity Heavy Duty Scalper.

Among the many Simplicity Horizontal screens operating on the iron ranges of Minnesota and Michigan are 6' x 20' Model "OM" double deck screens like the one shown here. This unit, equipped with ⅝" opening top deck and 1½ mm. dewatering surface on the bottom deck, has been operating successfully for many years sizing and dewatering heavy media concentration iron ore fast and efficiently. Simplicity Scalpers and heavy duty Os-A-Veyor Type Feeders also play an important part in metal mining operations by speeding up processing and handling production while keeping maintenance costs at a minimum. For complete information contact a Simplicity sales engineer or write us today.

143

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND, MICHIGAN

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.
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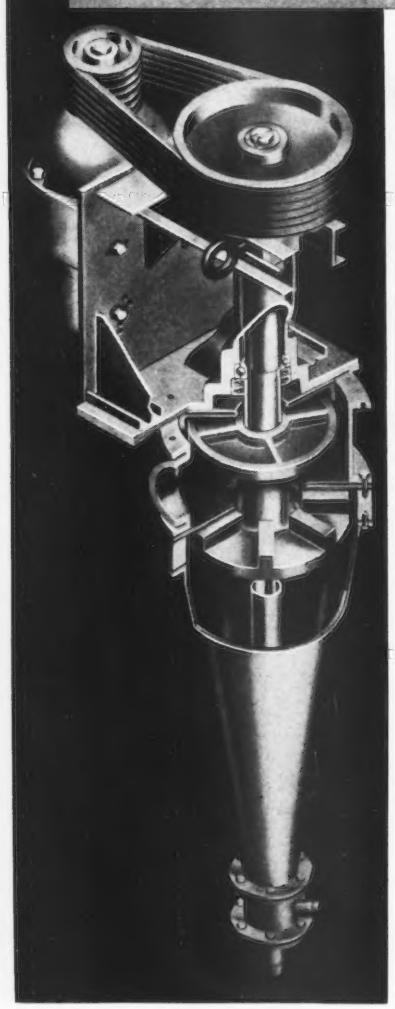
FOR EXPORT: Brown & Sites, 50 Church Street, New York 7, N.Y.

FOR
MICRO-SIZING
DESLIMING
DESANDING
CLASSIFYING
DEWATERING
THICKENING

Check these Operating Values in the

CENTRICLONE*



Combines the Action of the Conventional Liquid Cyclone and the Centrifuge

- ✓ Separates fines from coarse, or particles of different specific gravity, in liquid suspension with size separation down to 10 microns.
- ✓ Separations can be effected at very high slurry densities, thereby avoiding undesirable dilution; several Centriclones are working on feeds with 64% solids.
- ✓ Very high capacity which, coupled with design, minimizes floor space when set up either vertical or horizontal.
- ✓ High speed internal impeller, rather than high feed pressure through tangential orifice inlet, induces high circulating velocity and greater centrifugal force with economical power input.
- ✓ All parts subject to wear accessible for easy replacement.

The Centriclone, taken over by us in 1952 and further developed by our design engineers, often fits into the filtration picture as a feed conditioner which is one reason why we acquired it. But it has many other applications, as noted above. We'll be glad to discuss it with you if on further study you feel the Centriclone has any application at all in your flowsheet. And, of course, we'll also be happy to take care of your filtration problems, too.

Send for our Bulletin No. 800 which fully describes the CENTRICLONE

*Trade Mark

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In South America, Africa, remote Pacific Islands or wherever you have business branches abroad, your investment faces many hazards and is affected by unfamiliar local laws and insurance regulations.

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DALLAS OFFICE . . . . . MERCANTILE BANK BUILDING, 106 SO. ERVAY STREET, DALLAS 1, TEXAS
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SAN FRANCISCO OFFICE . . . . . 98 POST STREET, SAN FRANCISCO 4, CALIFORNIA
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TWENTY-FOUR AMERICAN CAPITAL STOCK FIRE, MARINE AND CASUALTY INSURANCE COMPANIES PROVIDING INSURANCE PROTECTION IN FOREIGN LANDS

Communist machine-gun fire dropped him in combat. But whole blood kept him alive, saw him through the hospital. He thanks you for his life.

She'd been exposed to polio. A new serum, *Gamma Globulin*, made from blood, helped ward off the dread disease. She thanks you for her life.

A tornado whipped suddenly across her home town. She was badly injured by falling debris. But a quick operation, several transfusions pulled her through. She thanks you for her life.

Three grateful people say: "we're HERE... because you were THERE!"

Each one of these people is alive today because someone gave blood.

If you've given blood before, you know how easy it is—how quick and painless. And you know what a wonderful feeling it is when you realize that what you've done may give another person his life.

Now you are asked to give blood . . . again and again. And you can do it safely every 3 months.

Because America's need for blood has increased enormously—for our armed forces, for accident and disaster victims at home, for new disease-fighting serums.

Many a life hangs in the balance! Will you help? Call your Red Cross, Armed Forces or Community Blood Donor Center today!

BUSINESS EXECUTIVES CHECK THESE QUESTIONS

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ◯ HAVE YOU GIVEN YOUR EMPLOYEES TIME OFF TO MAKE BLOOD DONATIONS?
- ◯ HAS YOUR MANAGEMENT ENDORSED THE LOCAL BLOOD DONOR PROGRAM?
- ◯ HAS YOUR COMPANY GIVEN ANY RECOGNITION TO DONORS?
- ◯ HAVE YOU INFORMED EMPLOYEES OF YOUR COMPANY'S PLAN OF CO-OPERATION?
- ◯ DO YOU HAVE A BLOOD DONOR HONOR ROLL IN YOUR COMPANY?
- ◯ WAS THIS INFORMATION GIVEN THROUGH PLANT BULLETIN OR HOUSE MAGAZINE?
- ◯ HAVE YOU ARRANGED TO HAVE A BLOODMOBILE MAKE REGULAR VISITS?
- ◯ HAVE YOU CONDUCTED A DONOR PLEDGE CAMPAIGN IN YOUR COMPANY?
- ◯ HAVE YOU SET UP A LIST OF VOLUNTEERS SO THAT EFFICIENT PLANS CAN BE MADE FOR SCHEDULING DONORS?

Remember, as long as a **single** pint of blood may mean the difference between life and death for **any** American . . the need for blood is **urgent!**

NATIONAL BLOOD PROGRAM

GIVE BLOOD

...give it again and again

Break it up to bite size...with APEX®

VERSATILE APEX explosives are an important factor in the amazing improvements in breakage now possible with the newest Atlas development . . . Alternate ROCKMASTER® combined with Alternate Velocity Loading.

Apex is an economical ammonium nitrate explosive with a patented assembly having a water-proof gelatin core that offers these advantages:

- **The water-proof core promotes complete detonation of the explosive in wet holes.**
- **Complete propagation of the column in any height face.**
- **Fluted-end cartridge permits easy loading.**
- **A wide range of strengths and velocities to choose from. Apex is available in 8 strengths: each in low, medium and high velocity.**

For maximum breakage, better control of throw and economical production, team APEX explosives with the ROCKMASTER Blasting System.

For complete information on all Atlas Explosives Products, ask your Atlas representative for a copy of the new Atlas Explosives Catalog.

ATLAS

ATLAS EXPLOSIVES

"Everything for Blasting"

ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE

Offices in principal cities

You SET THE SPECIFICATIONS

Special 4 x 6 Steam Fixed Drum Winch. Duty single line pull 4,300 lbs. at 90 FPM.

Superior-Lidgerwood-Mundy has the facilities and experience to meet them . . . either from an all-inclusive line of standard hoisting equipment or with equipment engineered to your specific requirements.

WRITE FOR BULLETINS AND CATALOGS

SUPERIOR-LIDGERWOOD-MUNDY CORPORATION

Main Office and Works: SUPERIOR, WISCONSIN, U.S.A.
New York Office, 7 Dey Street, New York 7, N. Y.

THE PAY-OFF

COMES FROM BETTER OPERATION OF THE BOOTH FLOTATION MACHINES.

REDUCED REAGENTS, SUPERIOR AERATION, LESS POWER — THIS IS THE WINNING COMBINATION.

INVESTIGATE

THE DIVIDEND PRODUCING FLOTATION MACHINE

WRITE FOR INFORMATION

BOOTH ENGINEERS

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MINERALS SEPARATION • SERVICE • EQUIPMENT

A tip for top performance

TeeCee
TUNGSTEN CARBIDE

&

"TYPE L"
ONE PASS STEEL

LIDDICOAT

DETACHABLE
DRILL BITS

MANUFACTURED BY

Thompson Products

THOMPSON PRODUCTS LTD. • ST. CATHARINES, ONT.

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something you want . . .

that other readers of this paper can supply

or —

something you don't want . . .

that other readers can use, advertise it in the

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Exploration for coal and other mineral deposits. Foundation test boring and grout hole drilling for bridges, dams and all heavy structures.

Core Drill Contractors for more than 60 years

JOY MANUFACTURING CO.
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STRAUB

HAS RIB-CONE MILLS FOR ALL GRINDING OPERATIONS

More than 100 sizes and types of ball mills. 40 years of experience in supplying every conceivable grinding requirement is at your disposal in the form of engineering counsel. *An inquiry to our engineering department will bring a prompt reply.*

STRAUB MFG. CO.

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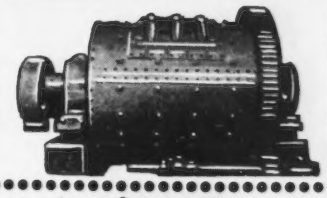
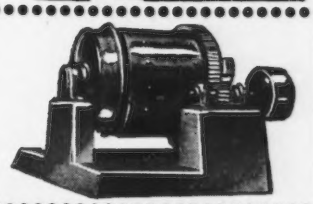
SECTIONALIZED MILL

Completely assembled in our shop, then marked and knocked down for shipping "Anywhere a Mule Can Go."



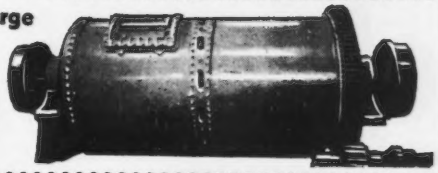
SCREENING MILL

Most economical type. Particularly suited to amalgamating and concentrating classes of ores. Capacity from 2 to 95 tons per 24 hours.



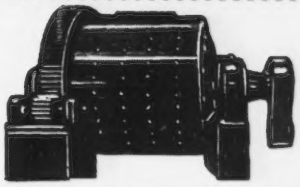
Peripheral Discharge MILL

Particularly suitable for producing a granular product. Designed for controlled grinding of tungsten and similar ores where sliming must be eliminated.



LOW PULP LINE MILL

One of the new Champion Series. Available in low pulp line, plain overflow, screening and convertible types with capacities ranging from 25 to 250 tons per 24 hours.



★ More than 100 Sizes and Types of RIB-CONE Ball Mills

Attention Flotation & Wet Mineral Dressing Operators

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the amazing new natural colloid is now freely available for immediate shipment in carloads or LCL lots

JAGUAR* is now being used successfully as a

CONDITIONING-REAGENT • DEPRESSANT FLOCCULANT

• Extremely Efficient • Easy to Use • Very Low Unit Cost

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Please send me a .....lb. free sample of STEIN, HALL'S JAGUAR.

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TITLE.....
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ADDRESS.....ZONE....STATE.....
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BOX NUMBERS count one additional line in undisplayed ads.
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EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style.

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The advertising rate is $12.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

Send NEW ADVERTISEMENTS to N. Y. Office, 330 W. 42nd St., N. Y. 36, N. Y. For May Issue closing April 21st.

REPLIES (Box No.): Address to office nearest you
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SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

SENIOR MINERALOGIST required for modern research laboratory in Northern Rhodesia specialising in problems of base metal metallurgy covering a wide field. Applicants should have major experience and interest in determinative mineralogy. Experience in allied fields of spectrography, metallography and x-ray crystallography desirable. Basic salary approximately £1,200 per annum depending on qualifications, plus variable cost of living allowance (at present approximately £120 per annum) and variable metal bonus (at present approximately 60% of basic salary.) Pension scheme and generous leave conditions, free transportation for successful candidate and family, excellent living conditions and outstanding amenities. Applications stating age, marital status, qualifications, experience record, availability, and accompanied by a recent photograph, should be addressed by airmail to The Secretary, P.O. Box 172, Kitwe, Northern Rhodesia.

GENERAL SUPERINTENDENT OR Project Manager. A minimum of 15 to 20 years experience in the operation and maintenance of heavy cranes and draglines required. Knowledge of all other heavy construction equipment desirable. Experience should also include responsibility for costs and the ability to deal and associate with Industrial Executives. Work involves the directing of operations on the site of a steel mill located near Calcutta, India. Address all replies to Box P-2195, Engineering & Mining Journal, giving complete personal information: All details of work experience; at least 5 references as to character and ability and the terms of employment and salary arrangements required.

ASSISTANT MILE Superintendent required by large base metal operation in South Africa. Successful applicant should be technical graduate with at least five years of good mining experience. Three-year contract. Transportation self and family, and salary with traveling. Climate and living conditions excellent. Apply to P-2283, Engineering & Mining Journl.

MINE CAPTAIN required by large base metal operation in South Africa. Successful applicant should have at least four or five years of good mining experience. Three-year contract. Transportation self and family, and salary while traveling. Climate and living conditions excellent. Apply to P-2284, Engineering & Mining Journal.

POSITIONS WANTED

ENGINEER MINING, Administrative and Planning. 25 years successful and Progressive Foreign and Domestic Mining operations. Open for engagement as manager or General Superintendent. Will consider contingent basis. PW-1622, Engineering & Mining Journal.

CIVIL ENGINEER, M.I.T. and Harvard Business School graduate, now employed, is tired of constant moving connected with heavy construction. Seeks responsible position with mining company where a wide knowledge of construction and civil engineering can be used to its fullest advantage. No objection to foreign work. Stability of location is prime requirement. Age 44, married, fluent French. PW-1745, Engineering & Mining Journal.

MINING ENGINEER—25 years experience, management, mining and metallurgical operations, evaluations of mines and prospects. Prefers gold. PW-1767, Engineering & Mining Journal.

POSITIONS WANTED

GEOLOGICAL ENGINEER, 49, married. Experienced administration, organization, research; exploration, production, markets; nonmetallics, ceramic materials. Desires responsible production or management position; technical direction research, development; or consulting engagement. Professional engineer: Mineral dressing, mining, geology, surveying. Available reasonable notice. PW-1603, Engineering & Mining Journal.

MINING GEOLOGIST, 32 years, Ph. D., nine years experience in all phases of mineral exploration, mine work, ore estimation, research and administration desires responsible position with mining company, location anywhere, available on 40 days notice, PW-1216, Engineering & Mining Journal.

MINING ENGINEER—37, Married. Fourteen years experience in all phases of underground mining operations, exploration, mine valuation and costs, and plant engineering. Registered Professional Engineer. Employed. Available reasonable notice. Will travel. PW-2175, Engineering & Mining Journal.

THOROUGHLY EXPERIENCED Comptroller-Treasurer employed nine years non-ferrous smelting, with experience in heavy construction. Available within ninety days. Resume on request. PW-2288, Engineering & Mining Journal.

BUSINESS OPPORTUNITIES

For Lease copper-gold mine DMEA approved. 21 patented claims. 12 million production. Shipping ore in sight, equipment lacking. Large mill grade potential. Write C. F. Williams, 110 Camino Pena, Santa Fe, N. M.

900 acres proven manganese lands in heart of Batesville-Cushman quadrangle, will sell; might lease. Write Bee Vanemburg, Owner, Batesville, Arkansas.

IRON ORE PROPERTY AVAILABLE FOR DEVELOPMENT

Estimated at 60,000,000 tons of iron ore to the 1000-ft. level

54 claims in the Townships of Genoa & Marion in the Sudbury Mining District, Ontario. These holding have a length in excess of five miles east and west straddling the iron formation.

Excerpt from the report of Charles C. Huston, P. Eng.

"There appears to be not less than thirty million (30,000,000) tons of product possible above the 500' level, of which possibly seven million (7,000,000) tons might be recovered as an open-cut operation. There appears to be no reason why this ore should terminate at 500' and it may easily extend downward for 1000'. If it were proved to extend to 1000', then there may be expected sixty million (60,000,000) tons of product, a figure amply sufficient upon which to predicate an operation.

"The ore is high in sulphur, but concentrating tests indicate a ratio of concentration of 1.3 to 1 with a roasted product which should carry 60 iron, 3 sulphur, 7 silica and .006 phosphorus.

"The ore is well emplaced for cheap mining and all other factors are not difficult."

Complete information obtainable on request—the company is willing to negotiate on a royalty basis or outright sale.

For further information correspond with the Company's Secretary:

GORDON McLAUGHLIN, Q.C.,
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372 Bay St., Toronto, Ontario.

ASSOCIATE WANTED

"Owner of a bauxite deposit, 12,000 acres in Northern Mexico, needs a capitalist associate to exploit this mineral. The mineral that supplies everything". Address to:

Felix Dominguez
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Cd. Juarez, Chih. Mexico

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Aero Service Corp. 50
Allen-Sherman-Hoff Pump Co. .. Second Cover
Allis-Chalmers Mfg. Co. (General Machinery) 14, 28, 61
Allis-Chalmers Mfg. Co. (Tractor Div.) 25, 44, 45
Allison Div. General Motor 60
Alloy Rods Co. 56, 57
American Air Filter Co. Inc. 180
American Cable Div. American Chain & Cable 55
American Cyanamid Co. Insert between pp. 50-51
American Foreign Insurance Assoc. 195
American Forge Co. 158
American Hoist & Derrick Co. 166
American Rubber Mfg. Co. 157
American Steel & Wire Div. U. S. Steel Corp. 12, 13, 151
Anaconda Wire & Cable Co. 117
Athey Products Corp. 64, 65
Atlas Powder Co. 197

Barber-Greene Co. 161
Bemis Bro. Bag Co. 162
Bethlehem Steel Co. 32, 129
Bin-Dicator Co. 192
Bixby-Zimmer Engrg. Co. 184
Booth Engineers 198
Boston Woven Hose & Rubber Co. .. 122, 123
Boyles Bros. Drilling Co. 107
Broderick & Bascom Rope Co. 139
Brunner & Lay Inc. 168
Bucyrus-Erie Co. 47
Builders-Providence Inc. 186

C & D Batteries Inc. 181
Caterpillar Tractor Co. 42, 206
Chemical Construction Co. 132
Chicago Pneumatic Tool Co. 50B
Cleveland Rock Drill Div. of Le Roi Co. 10, 11, 119
Cleveland Worm & Gear Co. 150
Collyer Insulated Wire Co. 165
Colorado Fuel & Iron Corp. 51, 142
Columbia-Geneva Steel Div. 12, 13, 151
Commercial Shearing & Stamping Co. ... 152
Continental Gin Co. 137
Coppus Engineering Corp. 115
Crane Co. 46
Crucible Steel Co. of America 34

Deister Concentrator Co. 124
Deister Machine Co. 171
DeLong Engrg. & Const. Co. 134
Denver Equipment Co. 29
Diamond Power Specialty Corp. 171
Dodge Mfg. Corp. 183
Dorr Co. 103
Dow Chemical Co. 155
du Pont de Nemours & Co., E. I. (Explosive Dept.) 111
Dwight-Lloyd Inc. 142

Eimco Corp. 31, 135
Electric Storage Battery Co. 169
Electro Dynamic Div. of General Dynamics Corp. 133
Engineers Syndicate 176
Ensign-Bickford Co. 16

Flexible Steel Lacing Co. 172
Fuller & Co. 170

Galigher Co. 189
Gardner-Denver Co. 167
General Electric Co. (Apparatus Div.) 17, 18, 19, 20
Geo-Optic Co. Inc. 176
Georgia Iron Works Co. 181
Godoy & Co. Inc. E. A. 138
Goodman Mfg. Co. 33
Goodrich Co., B. F. 5
Goodyear Tire & Rubber Co. 21
Gould-National Batteries Inc. 185
Greensburg Machine Co. 162

Hammermills Inc. Div. Pettibone Mulliken Corp. 154
Hannon & Sons, F. R. 148
Hardinge Co. 144, 145
Harnischfeger Corp. ..... Third Cover
Hazard Insulated Wire Works Div. Okonite Co. 141
Hercules Powder Co. (Explosive Dept.) .. 175

Ingersoll-Rand Co. 3

Jenkins Bros. 105
Johnson Co., C. A. 22, 23
Jones & Laughlin Steel Corp. 24, 53, 153
Joy Mfg. Co. 48, 49, 63, 198

Kaiser Engineers Div. of Henry J. Kaiser Co. 39
Kennedy-Van Saun Mfg. & Engrg. Corp. .. 109
Koehring Co. 22, 23
Laughlin Co. Thomas 160
Le Roi Co. 10, 11, 119
LeTourneau-Westinghouse Co. 8, 9
Link-Belt Co. 26
Lubriplate Div. Fiske Bros. Refining Co. 176
Lunkenheimer Co. 205

Majac Inc. 172
Mancha Storage Battery Locomotive Div. Goodman Mfg. Co. 33
Manhattan Rubber Div. 143
Marion Power Shovel Co. 149
McKee & Co., Arthur G. 113
McLanahan & Stone Corp. 191
Merrick Scale Mfg. Co. 174
Mine & Smelter Supply Co. 62
Morris Machine Works 130
Mt. Vernon-Woodberry Mills 147

Nagle Pumps Inc. 178
National Filter Media Corp. 128
Naylor Pipe Co. 116
Newport Industries Inc. 168
New York Engineering Co. 192
Nordberg Mfg. Co. 37
Northwest Engineering Co. 15

Ohio Brass Co. 179
Oliver United Filters Inc. 194

Parson Co. 22, 23
Pennsylvania Drilling Co. 192
Philadelphia Gear Works Inc. 131
Precision Radiation Instruments 171
Pressed Steel Car Co., Inc. 156

Raybestos-Manhattan Inc. 143
Reo Motors, Inc. 186
Research Corp. 126
Roebling Sons Corp., John A., sub. Colorado Fuel & Iron Corp. 51
Rust-Oleum Corp. 177
Ryerson & Sons, Inc., J. T. 166

Sanford-Day Iron Works, Inc. 173
Sauerman Bros., Inc. 138
Searchlight Section 200-203
Simplex Wire & Cable Corp. 27
Simplicity Engineering Co. 193
Smit & Sons, Inc., J. K. 146
Smith Engineering Works 41
Spang & Co. 140
Sprague & Henwood, Inc. 178
Standard Oil Co. of Calif. 38
Stearns-Roger Mfg. Co. 58, 59
Stein, Hall & Co., Inc. 199
Stephens-Adamson Mfg. Co. 52
Stoody Co. 125
Straub Mfg. Co. 199
Sturtevant Mill Co. 164
Superior-Lidgerwood-Mundy Corp. 198

Taylor-Wharton Iron & Steel Co. 136
Tennant, Sons & Co., C. 182
Tennessee Coal & Iron Div. 12, 13, 151
Texas Co. 6, 7
Thomas Flexible Coupling Co. 174
Thompson Products Ltd. 198
Timken Roller Bearing Co. .. Fourth Cover, 30
Tinney Drilling Co. 174
Traylor Engrg. & Mfg. Co. 54

Ultra-Violet Products, Inc. 182
United States Rubber Co. 127
United States Steel Corp. 12, 13, 151
United States Steel Export Corp. 12, 13, 151

Vulcan Iron Works 187

Walworth Co. 50A
Wedge-Wire Corp. 182
Western Machinery Co. 159
Western Precipitation Corp. 163
Western Rock Bit Mfg. Co. 190
Wheel Trueing Tool Co. 43
Wild Surveying Instruments H. 40
Wilfley & Sons Co., A. R. 66

Yuba Mfg. Co. 118

PROFESSIONAL SERVICES 188

SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hilty, Mgr.

EMPLOYMENT
Positions Vacant 200
Positions Wanted 200

SPECIAL SERVICES
Contract Work 200

BUSINESS OPPORTUNITIES
Offered 200

PROPERTY
For Sale 200
Wanted 200

EQUIPMENT
(Used or Surplus New)
For Sale 200-203
Pipe 201
Rail 202

WANTED
Miscellaneous 200

ADVERTISERS INDEX

Albert Pipe Supply Co., Inc. 201
American Air Compressor Corp. 201
Barrett, Bob 203
Basic Refractories 202
Brown-Strauss Corp. 202
Carlyle Rubber Co. 203
Capazo Brothers 203
Dominguez, Felix 200
Electric Equipment Co. 203
Florence Machy. & Supply Co. 203
Fogelman, Julius M. 203
F. M. & S. Mining Co. 200
Grey River Dredging Co., Ltd. 202
Heineken, Inc., W. P. 203
Kirk Co., Wallace 203
Lefton Industrial Co. 202
Lindstrom & Andell 203
Manganese, Inc. 203
McLaughlin, Gordon 200
Miller Machinery Co., Inc. 203
Morse Bros. Machy. Co. 201
O'Neill, A. J. 203
Schoomaker & Co., A. G. 202, 203
Smith Co., H. Y. 203
Stanhope, Inc., R. C. 202
Universal Wire & Cable Co. 202
Vulcan Detinning Co., The 202
Yuba Manufacturing Co. 202

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Iron Body Bronze Mounted
2½ to 8 inch sizes
200 lb. W.O.G.
Fig. 1686
2 inch size
225 lb. W.O.G.

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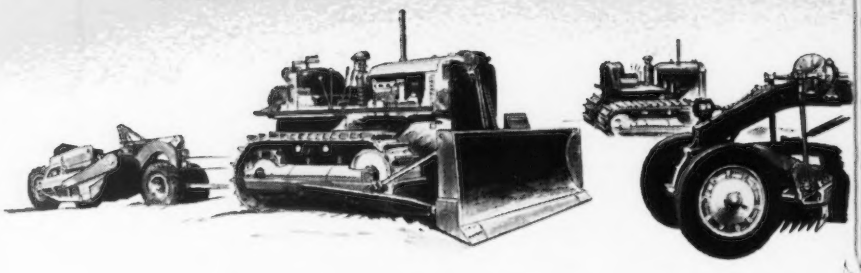

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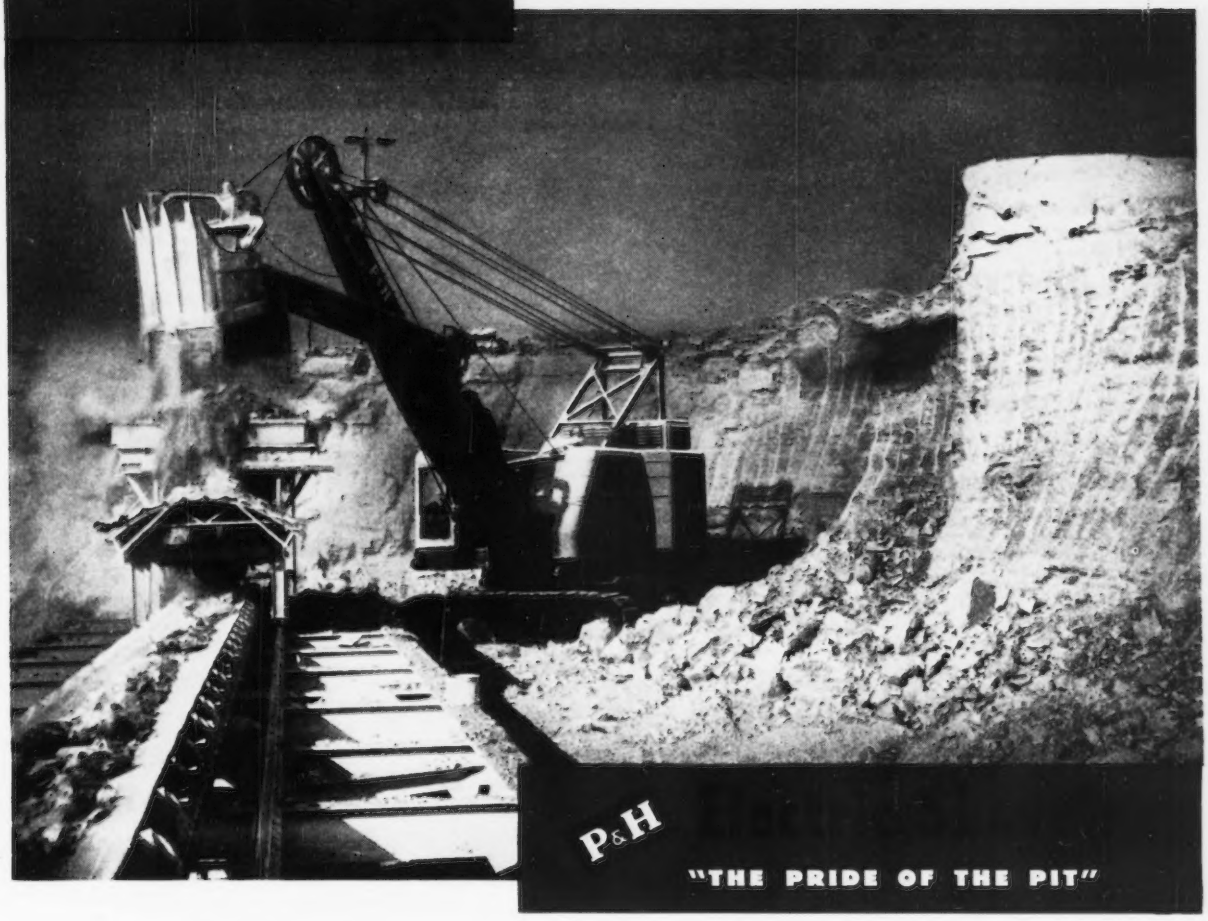

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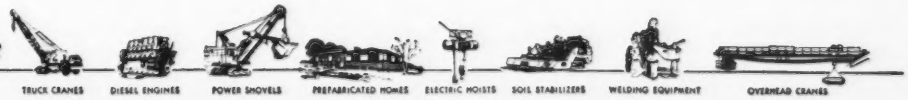


How TIMKEN® bearings help miners commute in comfort

THIS Brown-Fayro Man-Car whisks miners to and from the mine face as smoothly as a commuter's special. No wonder. Its wheels roll on Timken® tapered roller bearings.

Over 500,000 coal-hauling cars roll on Timken bearings, too. Timken bearings cut costs because they:

1. TAKE GREATER SHOCK LOADS. Made of Timken fine alloy steel—case hardened to provide a hard, wear-resistant surface over a tough, shock-resistant core—Timken bearings can take the pounding a mine car gets.

2. INCREASE CAPACITY. Since loads are carried on a *line* of contact between rollers and races, Timken bearings have extra capacity.

3. MAKE STARTING EASIER, PERMIT LONGER TRAINS. Timken bearings' true rolling motion and smooth surface finish practically eliminate friction.

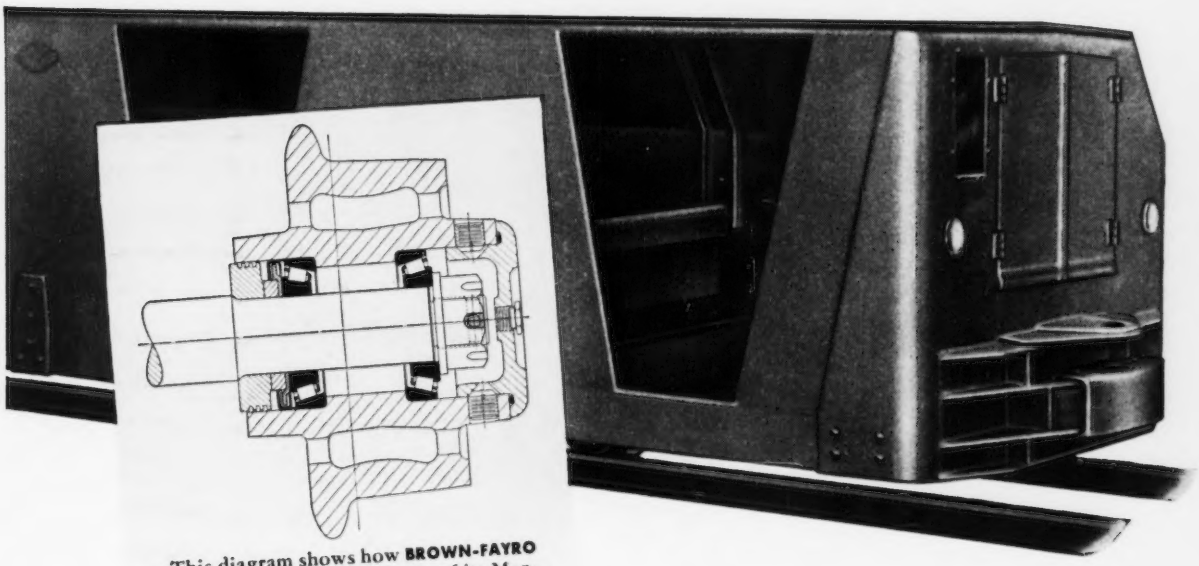
4. SAVE LUBRICANT. Timken bearings keep housings and shafts concentric, make closures more effective. Lubricant stays in—dirt and moisture stay out.

5. SIMPLIFY INSPECTION. Wheel mountings are simpler, you just pull cap, cotter pin and nut to inspect.

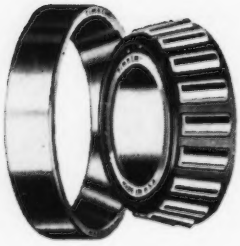
6. ELIMINATE SPECIAL THRUST PLATES. Timken bearings' tapered construction takes radial and thrust loads in *any* combination. Cars take curves easier.

Put these advantages to work for you. Specify Timken bearings in the mining cars you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



This diagram shows how **BROWN-FAYRO COMPANY** mounts the wheels of its Man-Car on Timken tapered roller bearings to insure long, trouble-free operation.



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WE MAKE OUR OWN STEEL

The special grade alloy steel which gives Timken bearings their strength and resistance to wear is made in our own steel mills.

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